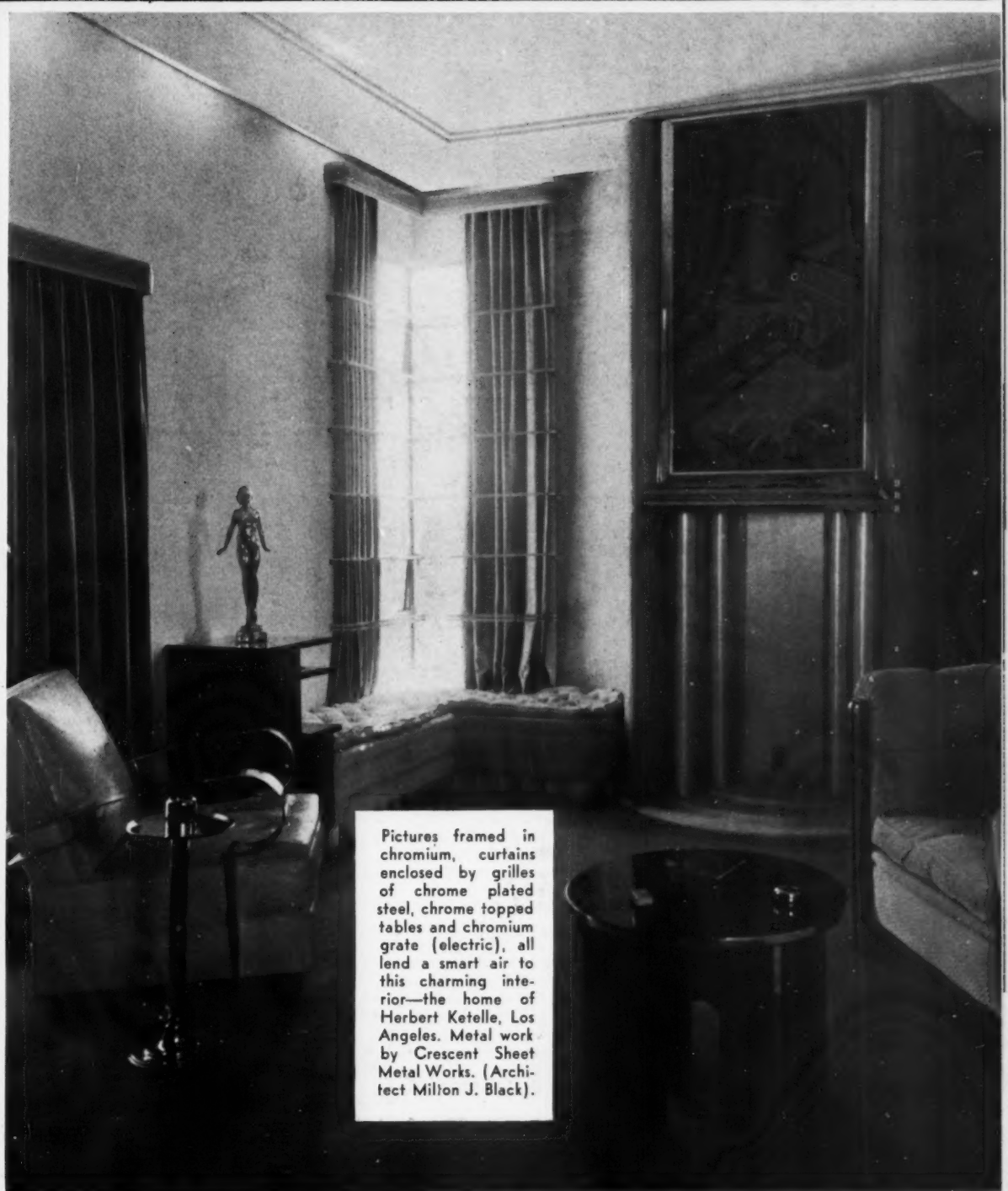


# AMERICAN ARTISAN

WARM AIR HEATING • AIR CONDITIONING  
SHEET METAL CONTRACTING



Pictures framed in chromium, curtains enclosed by grilles of chrome plated steel, chrome topped tables and chromium grate (electric), all lend a smart air to this charming interior—the home of Herbert Kettle, Los Angeles. Metal work by Crescent Sheet Metal Works. (Architect Milton J. Black).

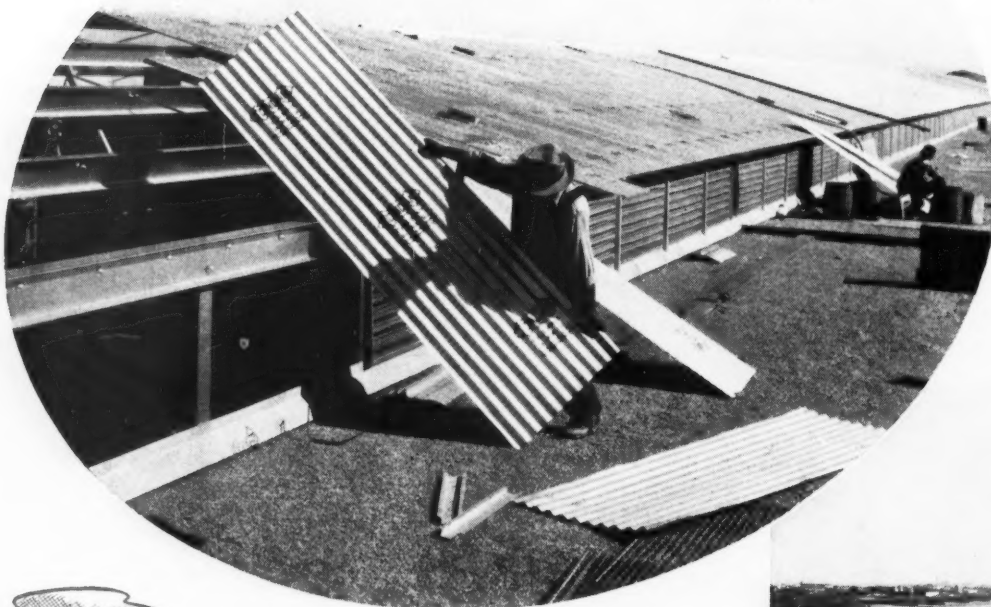
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MAY  
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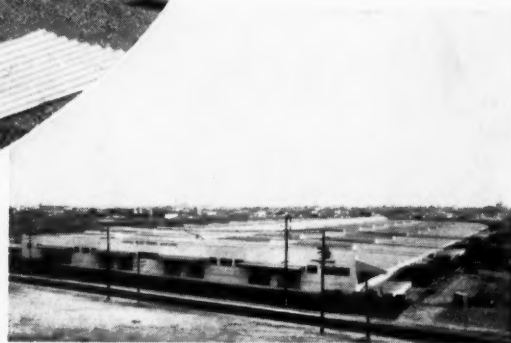
THE AIR CONDITIONING SECTION

Page 23

THIS WILL BE A GOOD ROOF . . .



FOR A *LONG, LONG* TIME



• Long life was built into these sheets in the open hearth. Skilful rolling preserved this quality, and hot dip galvanizing further added to the life of the base metal—Toncan Iron.

Industrial buildings represent a fruitful market for the sheet metal contractor. Industry everywhere is expanding. New buildings are needed. Old buildings must be repaired. For both, no better metal exists than Toncan Iron—the alloy of refined open-hearth iron, copper and molybdenum with the highest rust-resistance of any ferrous metal in its price class, and with working qualities that enable you to cut fabrication costs.

A good illustration of the size of this market is the plant pictured here—80,000 pounds of Toncan Roofing Sheets—and an installation that through the years will build good-will for the contractor through its long life and low maintenance.

Write for a copy of "The Path to Permanence." Every sheet metal contractor should know the facts this interesting booklet contains.



Republic Steel  
CORPORATION

GENERAL OFFICES . . . CLEVELAND, OHIO

Look to Republic as a major source of supply for flat and corrugated sheets—Plain Steel, Copper-Bearing Steel, Pure Iron, Copper-Bearing Iron, Toncan Copper Molybdenum Iron and the famous Enduro Stainless Steels. A quality of sheet for every degree of corrosion-resistance.

When writing Republic Steel Corporation for further information, please address Department AA.



# **ONLY** the Furnace Man can offer the most practical **Home Cooling System**

**9 CHANGES** of  
**NIGHT AIR**  
per hour will effectively  
cool a building\*

A large size furnace blower will accomplish this result. It will filter the air as well and provide relief for hayfever sufferers. Inexpensive changes in standard practice will accomplish this result.

## **Double** use with **Double** value will **Double** Sales

Every home owner wants summer cooling. Now every furnace owner can afford it. You will have a spring rush if you spread this news. Think of it! Summer cooling — forced heat circulation — year 'round filtering with substantial fuel economies that pay the entire cost in a few years — — — all for the price of an electric refrigerator.

\* You must provide blower capacity for at least 9 complete changes of household air per hour during the night before you dare make any claim for effective summer cooling (see University of Illinois Research Data).

*Exclusive Eastern Distributors and Export Agents*  
**MELCHIOR, ARMSTRONG, DESSAU CO.**  
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**RUSSELL ELECTRIC CO., Mfrs., 342 W. Huron St., CHICAGO**



**ONLY HOLD-HEET**  
Blowers Have the Reserve  
Capacity to deliver Summer  
Cooling with Economy in Equip-  
ment and Operating Expense.

The smallest sized unit, No. B1F (illustrated), has sufficient capacity for a 14,000 cubic foot house. This is approximately double the volume required for winter heating.

### **GET THE FACTS NOW**

Diagrams, instructions, University of Illinois Research Data with night cooling curve—full descriptive matter on the only complete line of night cooling fans—for summer cooling where home owners did not have the foresight to install a furnace system. *Write Today.*

## In This Issue

We believe that PWA should have the backing of contractors wishing to handle work let to contract. An analysis of the present situation is presented on page 11.

Selling metal for interior home decoration may be a new idea to many contractors. The Crescent S. M. shop in Los Angeles has been doing this type of work for some time. A story of their activities is published on page 12.

The argument of the moment is Social Security. Much that is correct and much that is incorrect is being bandied about. Joseph G. Dingle, C.P.A., on page 15, begins the first of a series presenting suggestions on just what you must do.

In the small town of Brazil, Indiana, Clifford Humble has made an enviable reputation for being a clean cleaner. How he built up this reputation is told on page 20.

We continue the Minneapolis Code on page 75. This section covers regulation for installation of oil burners.

Contractors are always interested in actual costs and results in residential cooling jobs. A report of cooling operations last summer in a Kansas City house (where they have real hot weather) is on page 29.

One of the important decisions to be made is where to place the registers. Especially when cooling is installed or contemplated. S. Konzo presents the facts on page 32.

On page 34 is an article describing a zone operating system (gas) which has to heat a two-story gallery in a double-wing house. Those doing this class of work will find several suggestions for design.

G. A. Voorhees continues his series on converting gravity systems to forced air on page 36. This article covers the tricky subject of return air and how to handle it.

We take pleasure in presenting one of the best articles of its kind that we have seen on page 38. The article is one of three presenting a complete method for calculating the cooling load.

The article in April on results of oil burning in residences is concluded on page 46 showing a survey of results in dozens of houses.

# AMERICAN ARTISAN

With which is merged

FURNACES  
AND  
SHEET METALS

AND

Warm-Air  
Heating

Covering All Activities in  
Gravity Warm Air Heating Forced Warm Air Heating  
Sheet Metal Contracting Ventilating  
Air Conditioning

J. D. Wilder, Editor

Vol. 105 No. 5

May, 1936

Founded 1880

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**More than 7,000 Copies of this Issue are being distributed**



# POWERFUL SELLING HELP

EXAMPLE—THIS LARGE 40-PAGE, 4-COLOR SALES PORTFOLIO FURNISHED RUDY DEALERS

THE WINTER



**HEATS THE AIR**

To heat desired temperature with coal, oil or gas.



**HUMIDIFIES THE AIR**

Gives your home the freshness of June all year round.



**CIRCULATES THE AIR**

Mixes cold rooms warm, eliminates drafts and cold spots.



**CLEANS THE AIR**

Removes dust, dirt, and bacteria. Promotes health.

IN THE SUMMER



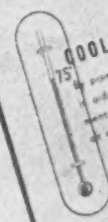
**CIRCULATES THE AIR**

Ensures movement of air through the home.



**CLEANS THE AIR**

Removes dust and pollen.



**COOLS THE HOME**

Provides a gentle air movement, body circulation, cooled and temperature is actually reduced. Equipment may be added for positive dehumidification and air cooling now or whenever desired.

## BALANCED ATMOSPHERE

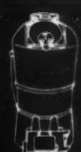
**BUILDING BUSINESS** for the dealer has always been accepted by Rudy as a fundamental responsibility of the furnace manufacturer. Costly literature such as illustrated equips Rudy dealers with powerful selling ammunition which is daily converting prospects into Rudy owners.

THE RUDY FURNACE COMPANY...DOWAGIAC, MICHIGAN

# RUDY

PRODUCTS

ALWAYS MENTIONED WHEN  
BETTER HEATING IS  
DISCUSSED







He's a pretty normal sort of person, your customer—loyal to those who serve him best . . . likes to get a bargain and mighty proud when he makes a sound investment. And he doesn't want false economy.

*He's a good customer, too, once you've sold him on your service, skill and materials.*

Sell him Armco Ingot Iron and it will be a good investment for both of you. This durable, easy working sheet metal helps you gain new customers and hold old ones. National advertising since 1914 has gained for it strong public preference. Thirty years of all-round service has proved its exceptional dura-

bility. Armco Ingot Iron is one sheet metal on which you can safely stake your reputation.

You also can depend on the name Armco to help you sell plain and copper-bearing steel sheets for less severe service requirements.

Get in touch with the Armco Distributor. He will serve you promptly with all grades of sheet metals bearing the well-known Armco name. And be sure to ask him about the many valuable business services he offers, such as job cards, blotters, folders and advertisements. The American Rolling Mill Company, Executive offices, 703 Curtis St., Middletown, Ohio



## ARMCO INGOT IRON

CALL THE ARMCO DISTRIBUTOR—TODAY



*And they're RIGHT!*

\*

These men know their market . . . and when they give their ungrudging O.K.—we believe them! We feel as they do—that our newest “PERFECT” Warm Air Furnace, square series “S,” is a job hundreds of home owners will be proud of. So why not begin right now! Get those prospects to have an actual installation! Show them how the square cases, finished in lustrous maroon lacquer, are made especially to meet the specifications of forced air work. And how the mechanism for oil or coal burning installations can be concealed in the back of the full width doors.

Then tell your prospects about the modern demand for warm air heating—and how, because of its simplicity, it is the most economical method of heating. Explain that heating in itself is not enough, and why humidified and clean air are a necessity. And how the positive circulation of air—giving a cooling effect in summer and uniform room temperatures in winter—is provided by a quietly efficient, inexpensive blower.

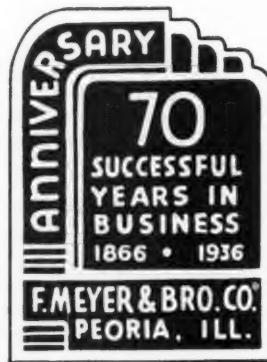
*Snapped at the convention of the New York State Sheet Metal and Roofing Contractors' Association.*

Top this off by showing the sturdy caliber of R & B craftsmanship . . . and of “PERFECT” Warm Air Furnaces. Get one of your clients to tell your prospects how much *he* likes R & B equipment—and then watch the dotted line filled out in record time!

**RICHARDSON and BOYNTON Co.**

244 Madison Ave., New York City  
Branch Offices in Principal Cities

*Backing us up, in the above picture, are (reading left to right) H. H. Lorenzo, Richardson and Boynton Co.; Arden Zipp, Doyle Hardware Co., Dolgeville, N. Y.; John Rauschke, Laver and Rauschke, Utica, N. Y.; Wm. Mahaney, Doyle Hardware Co., Utica, N. Y.; Frank Bockhardt, Utica, N. Y.; Wm. Crane, Crane and Page, Binghamton, N. Y.; W. J. Roys, Richardson and Boynton Co.; Benjamin Crane, Crane & Page, Binghamton, N. Y.; Allen F. Martin, Richardson and Boynton Co.*



**1866:** Frank Meyer's one-man tin-shop.

**1872:** Brother Dirk enters firm of "F. Meyer & Bro."

**1890:** George Meyer and George Harms come in and the firm is incorporated as "F. Meyer & Bro. Co."

**1892:** Same men incorporate "The Meyer Furnace Company" and start manufacturing The WEIR STEEL FURNACE.

**1894:** Famous HANDY FURNACE PIPE developed and put on the market.

**1908:** HANDY one-tongue self-locking pipe (a great improvement) offered the furnace trade.

**1918:** The VICTOR FOUNDRY CO. incorporated to supply our own castings and make them for others.

**1925:** COMBINED CAPITAL OF THE MEYER CORPORATIONS: \$1,000,000.00.

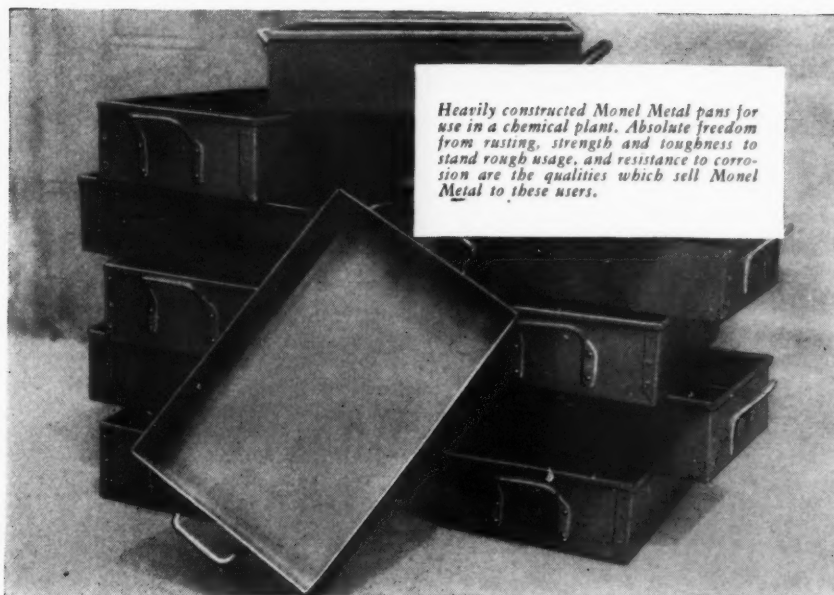
**1936:** National Leaders in Furnace Pipe and Furnace Manufacture, and today it is truer than ever before:

*"The Handy Pipe People Are  
A Mighty Fine Bunch To Tie To!"*

**F. Meyer & Bro. Co., Peoria, Ill.**



# Tips on Trays



Heavily constructed Monel Metal pans for use in a chemical plant. Absolute freedom from rusting, strength and toughness to stand rough usage, and resistance to corrosion are the qualities which sell Monel Metal to these users.

*No profits in being a "waiter". . . Go out and tell your customers you make trays of Monel Metal!*

THOUSANDS of trays like the ones on this page were made and sold last year. Thousands more will be sold this year. Are you getting your share of the business?

It's easy business. And it's profitable business. Every merchant who handles or processes food needs trays. Bakers use them. Makers of chemicals use them. As you can see, even schools use

them. These men may not know the trays they need should be Monel Metal until you tell them. But they'll see it soon enough when you do.

What they want is a tray that does not rust. That resists corrosion and cannot taint any foodstuff or other product it touches. That has the strength and toughness to stand up under rough and careless treatment. All that means they need trays of Monel Metal.

What you want is orders. Orders for material which can be easily worked . . . for jobs which give you an honest profit. And orders which com-



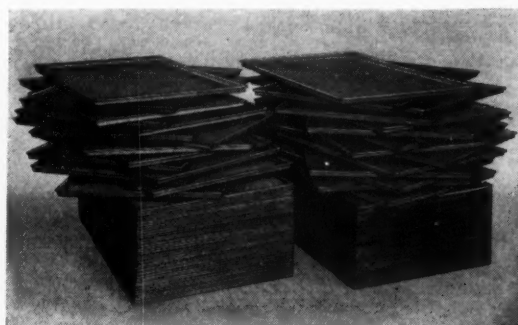
Fabricated Monel Metal trays used for the handling of sausage casings. These trays are readily made of Monel Metal in sizes especially suited to the packer's requirements.

monly demand a large number from each customer. Monel Metal trays fit that picture too.

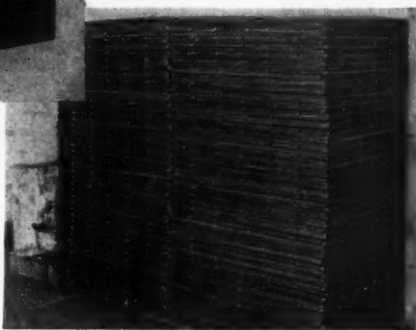
Go around a few blocks in your city. Spread the word among packers, food wholesalers, laboratories and chemical plants that you can make the trays they need. It won't take you long to pick up some healthy orders. And soon after, some sizable profits from those orders.

For complete prices on Monel Metal Sheet, and full instructions for working, write to-day to:

THE INTERNATIONAL NICKEL  
COMPANY, INC.  
67 WALL STREET NEW YORK, N. Y.



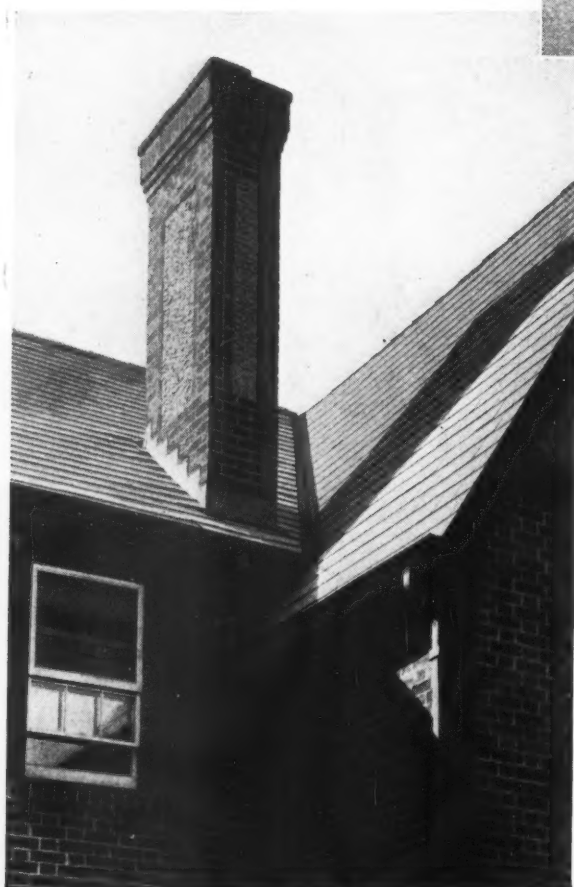
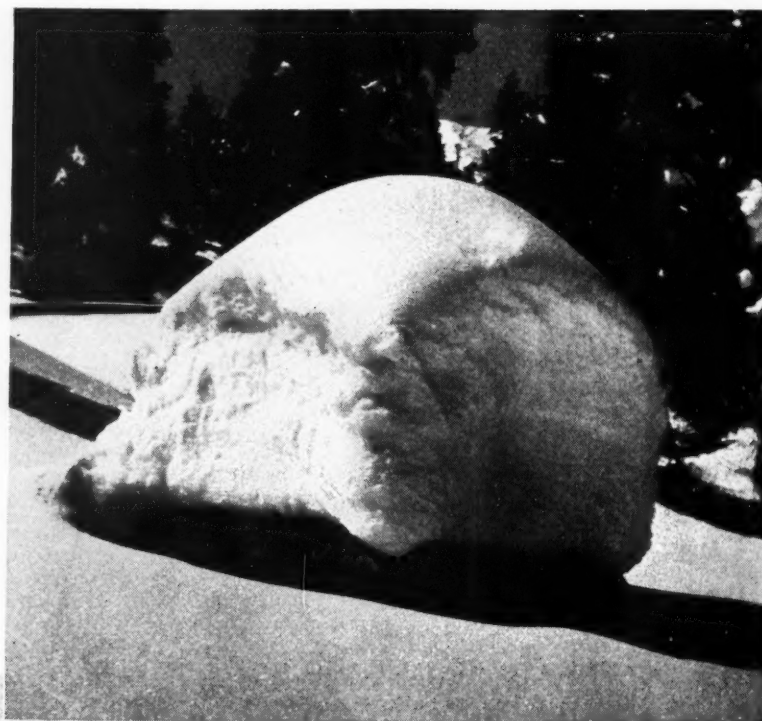
(Above) Monel Metal rectangular shallow trays suitable for drying, cooling, displaying, handling and general processing of foodstuffs and related products such as edible dyestuffs and flavoring extracts. (Right) 1000 Monel Metal window flower box pans fabricated by a Minneapolis artisan for use in the public schools of Minneapolis, Minn.



Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

# Monel Metal

# *Winter* **PAYS YOU** **A BONUS!**



**T**his past Winter accounted for a great deal of wear and tear on houses and other buildings. Repairs are needed. Do your customers a real service. Sell the use of rust-proof, leak-proof Revere Copper for roofs, flashings, gutters, downspouts, and other sheet metal purposes.

You'll find Revere Sheet Copper extremely workable. It comes in soft and hard tempers, and in a variety of finishes which meet any requirement. And sell Revere Leadtex (lead-coated sheet copper) for beautiful and unusual decorative effects. Both types of sheet metal mellow as the years advance.

Count on the century-long, country-wide reputation of Revere to add prestige to your work. Added to your own skill . . . it will bring you more jobs, larger contracts, and steady profits. Sheet Metal Distributors in every section of the country carry stocks of Revere products. Why not use Revere on your next job? Write for detailed specifications.

# **Revere Copper *and* Brass**



INCORPORATED

EXECUTIVE OFFICES: 230 PARK AVENUE, NEW YORK CITY • MILLS: BALTIMORE, MD. • TAUNTON, MASS.  
 NEW BEDFORD, MASS. • ROME, N. Y. • DETROIT, MICH. • CHICAGO, ILL. • SALES OFFICES IN PRINCIPAL CITIES



## AMERICAN ARTISAN

Volume 105

Number 5

P W A  
—  
W P A

Every contractor operating in the construction industry (and this includes our sheet metal, ventilating, heating, air conditioning contractors) should be vitally concerned in the battle being waged in Congress to get an appropriation of money to carry on PWA. To clarify the situation let us review briefly what has happened and what may occur.

Congress established PWA as an agency to allot money and correlate and approve plans for public construction where the project was initiated and surveyed by the community. Each community submitted to PWA a list of projects which would benefit the community and give work to unemployed mechanics of the building industry. PWA approved or rejected the projects and when approved granted the community funds equal to 30 per cent of the cost of labor and materials.

As any constructor will appreciate that the formation of projects, drawing of plans, preparing of specifications and awarding of contracts was a gigantic undertaking. Persons not familiar with these details said PWA was too slow—people would starve to death before the engineers got the work off their drawing boards.

Nevertheless by December 31, 1935, PWA had allotted more than 327 millions of dollars for almost 5,000 projects and 80 per cent of the work was under contract. For some reason, however, PWA has not enjoyed the official recognition deserved. Equally confusing, even before PWA was well launched in its program WPA was set up and for several months caused the greatest of confusion as projects were juggled from PWA to WPA and back again.

WPA, quite unlike PWA, consists solely of work selected by the Federal government and paid for by the government. To get on a WPA payroll a man must be actually on relief. The taxpayer, out of work, but not on relief, cannot secure employment. Quite naturally, there has been many accusations of graft and unfairness in WPA. This should require no amplification.

The point at issue is that unless members of congress are told that the construction industry wants PWA, PWA is likely to die a financial death within

a very few weeks because the billion and one-half requested by President Roosevelt on March 18 is earmarked for WPA and CCC and no part for PWA.

We believe that in spite of the delay and red tape, PWA was soundly conceived and honestly administered and that most of the projects completed or let to contract will be useful in the years to come. On the other hand, there is much doubt that leaf raking, road shoulder building, tree transplanting by amateurs will serve any useful purpose for a very long time.

A group of congressmen under Mr. Alfred L. Beiter of New York is working to get from the 1½ billion relief appropriation \$700,000,000 for PWA. It is estimated that with this serving as 45 per cent of the cost of labor and materials at least 1½ billions of work could immediately be let to contract as all plans and specifications are now ready.

Our congressmen probably understand this situation, but need assurance that the construction industry is behind PWA before they will act. An expression of sentiment is needed.

### F. H. A. Changes

Five important changes became effective April 1 in the modernization credit plan of FHA as the Federal Housing Plan was extended to April 1, 1937. These changes will effect

the operation of FHA with respect to the building industry.

The first change eliminates new construction on all unimproved real property and the exclusion of loans to tenants except those who are lessees. The act now reads—"Insured loans may be made only to owners of improved real property or to lessees of such property who have a lease extending for a period of not less than six months beyond the maturity of the modernization credit loan."

Of great importance to us (as pointed out in our editorial in the November, 1935, issue) is the second change wherein equipment and machinery which are movable and cannot be said to become a part of the real property are excluded from insurance loans or advances of credit in the amount of \$2,000 or less. Under this new ruling heating equipment, such as furnaces, blowers, central air conditioning systems, are eligible for loans of credit but refrigerators, washing machines, etc., are not eligible.

After March 1, 1936, insurance against loss to the lending agencies is reduced from 20 per cent to 10 per cent of the total amount of loans or credit outstanding. Another change reduces the maximum liability which the FHA administrator may incur from 200 million to 100 million dollars.

The fifth change places churches in class A entitling them to borrow up to \$50,000 instead of \$2,000 as heretofore.

As we pointed out previously, this act was designed to stimulate construction and modernization, but high pressure selling sold apparatus which requires little material or labor but which did obligate the buyer to an extent which prohibited purchase of the equipment and services we sell.





## Crescent, Los Angeles, Stresses Modernization With Metal and Opens New Field For Metal As Interior Decoration

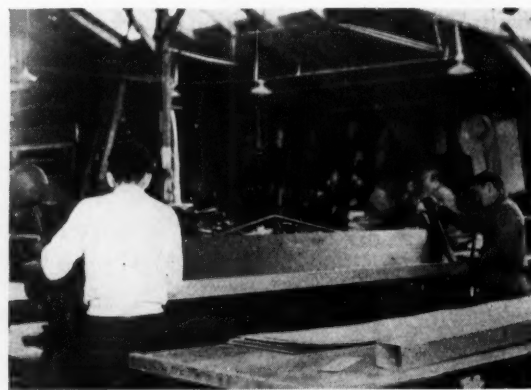
By A. B. Laing

FOR a long time, Dave Elkin, president of the Crescent Sheet Metal Works, Los Angeles, had been prescribing bright metal store fronts as a remedy for ailing businesses. But it was only recently that this pioneer firm took a dose of its own medicine—modernized their premises at 1154 Highland Ave. with a new facade of gleaming glass, aluminum, copper and stain-

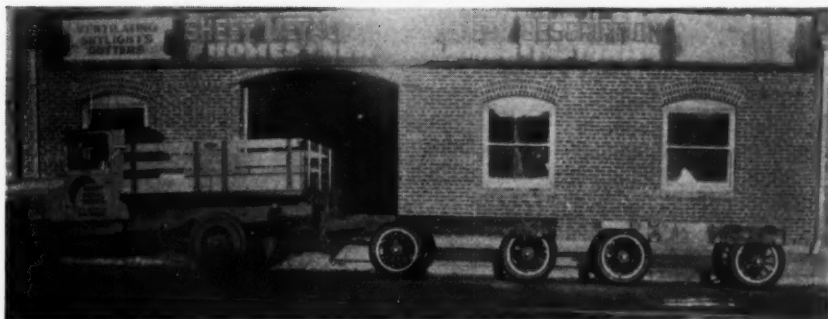
less steel. And the results surprised even Mr. Elkin himself.

This prominent California sheet metal shop has been doing business for twenty years continuously at the same address—but by no means “at the same old stand,” as the accompanying photos of its building’s transformation will attest.

The metallic face-lifting operation increased Crescent’s trade some 30 per cent. Yet it was accomplished in quick time at small outlay in actual cash. Crescent’s own crews did the work, crews alternating between shifts on outside jobs, from plans drawn by a Los Angeles architect, George S. Dudley. Aluminum and monel were used in the clever combination seen in the “field,”



From left to right—Spot welding a conductor strap, indicative of the modern time and cost saving methods of the shop. Center—Foreman E. J. Vanderbosch does all of the arc welding, being a professional. Right—When shelf stocks wane crews work up standard sized sections of such stock material as ventilating pipe, etc.



Above the old exterior of the Crescent shop. Compare this exterior with the bright, attractive exterior of the remodeled front on the page preceding. The text explains in detail the materials and construction of the new front.

while the bold lettering of 16 oz. copper furnished both trim and color contrast. These massive looking letters were worked in cold rolled copper. To preserve its characteristic sheen, the copper was first flattened down with steel wool and then coated with thin lacquer so that the metal's high refractive qualities might be enhanced.

#### How Modernizing Pays

"Our motive in modernizing at this time," says the head of this concern, "was to attract the attention of architects and builders and at the same time teach a vivid lesson to the public on new metal forms and modes and their place in present day architecture. We wanted to answer before they asked such questions as: 'Who does first class store front work and what is his address?'"

That the modernization attracted attention is indicated by three outstanding sheet metal front jobs secured within three weeks of the day Crescent completed its new front. Shortly thereafter, a leading metal manufacturer "picked up" the Crescent building and carried it into a full page ad in a national medium (publicity which cost Crescent nothing), pointing out in this widely circulated journal:

"What was formerly just a shop became a showroom!"

The Crescent building is easily the brightest and smartest structure in its semi-retail zone. Traffic past the block is estimated at 95 per cent vehicular, yet this conspicuous structure stops a steady trickle of patrons and holds enough regular customer trade to keep a force of eighteen mechanics busy turning out orders.

Smarter, pleasanter working conditions instilled a much greater

pride-of-the-shop among the boys who handle the tools, lowered overhead costs and, as for labor turnover—from the day Mr. Elkin handed himself the keys to his lustrous new home, it has been practically NIL.



At the polish-and-inspection bench. Kenneth Dunbar gives this handsome monel hood a rub-down. Formed with soldered joints with copper protected edges and rosettes.

Since the artistic and industrial phases of sheet metal working are Crescent specialties, many fine orders outside this scope are declined. Furnaces are "out." So, for instance, are metal ceilings. So are



T. L. Koch, expert accountant, makes all the black-ink entries for this busy shop. In the background, Manager Vanderbosch figures some knotty turns in an air-conditioning installation.

big air conditioning jobs, excepting those ventilating or refrigerating installations of a special nature or allied to a company specialty.

Although Crescent is often coaxed by customers to perform such services and has, on occasion, succumbed, for the most part, all requests for estimates and bids on such work are delegated or sub-contracted to houses which exclusively install and service these respective items.

#### We Restrict Our Field

This unusual policy is explained by President Elkin:

"We're simply following the modern trend. In the larger communities, where competition is becoming constantly sharper, it is necessary to partition the trade so there may be work for all—that each, moreover, may become more proficient in his chosen branch. A good parallel is found in the profession of medicine. A metropolitan eye doctor may be perfectly qualified to deliver babies for his patients, but he finds it pays him better in the long run to refer all his confinement cases to an obstetrician. We could put in an elaborate heating plant and nobody could do a neater job; still, it would have little in common with our usual shop routine; it would mean taking our highly skilled shop force off some intricate architectural or specialty job in which they excel.

"On the other hand, by passing a heating inquiry to a firm of furnace experts with a good floor stock from which the customer may choose and all the equipment to service the completed job, everyone is better satisfied. Reciprocating, the heating man is likely to divert his general sheet metal calls to us because of our knowledge, experience and equipment that enable us to handle the work more efficiently, economically and with a style and finish unsurpassed."

#### Shop Arrangement

Shop layout can be briefly described. Across the front of the building, except for the truck entrance, the big chrome-trimmed windows light the main office. Here President Elkin has his private desk along with his accountant and stenographer. Shop Manager C. Vanderbosch occupies the far corner



Above—In the boudoir of Elissa Landi. One entire wall is plate glass trimmed in filagree designs of chromium and aluminum.

Right—Stainless steel curtain valances, picture mold and horizontal runs adorn the buffet and bar of Mary Boland.

Some  
Crescent  
Work



This insulated double metal walled cabinet equipped with sprinkler system satisfies all requirements of underwriters, fire departments and building superintendents. Part of a shipment made for a film exchange.



Left — Hundreds of visitors to a recent Los Angeles builder's show, enjoyed a vivid lesson in what to do and not do with metal trim about the house. Speaking of this graphic presentation of the right and wrong way of installing metal, Mr. Elkin said, "It's probably the best ad we ever put out." The display stood for 30 days. Right—Crescent has done



some notable work on interior trim. The photograph showing chrome edged surfaces on furniture and walls in the home of Herbert Ketelle, brings out the beauty and practicality of this versatile metal.

of this airy office with his draughting paraphernalia. The latter qualified himself in sheet metal pattern drafting and architectural drafting by attending evening classes after turning in a full day's work in the shop. That the practical and theo-

retical training of this young superintendent has had much to do with the landing and expert fulfilling of Crescent contracts is appreciated by the entire organization.

Away to the rear of the building is the foreman's office, communicat-

ing with the executives up front by a system of call bells.

"IN." Delivery trucks enter under the one wide, hinged-from-the-top chrome door which is raised or lowered by hand windlass. (A  
(Continued on page 97)



# Social Security—

## A Summary of Its Immediate Requirements

By Joseph G. Dingle  
C. P. A., Ottawa, Ill.

**T**HIS Act imposes a tax on "Employers of Eight or More" on all wages paid on and after January 1, 1936. For 1936, this tax is at 1% of wages paid; for 1937, the rate is 2%; and for 1938 and thereafter the rate is 3%. This tax is being levied for the purpose of permitting the Federal Government to make "Grants to States for Unemployment Compensation Assistance." (Note that word "assistance.") The Federal Government will pay no unemployment compensation to the unemployed. It is required, in the Federal Act, that each State must enact its own Unemployment Compensation law, acceptable to the Federal Security Board, and until such State law is passed, there is no Unemployment Compensation paid into that state.

### State Laws

If the state enacts an Unemployment Compensation Act which is acceptable to Washington, the employer is permitted a credit up to 90% of the total Federal tax, subject to certain restrictions. If, however, there is no acceptable state law, the full Federal tax must be paid— notwithstanding the fact that there will be no unemployment compensation benefits for the employees of the employers who pay the tax.

### Old Age Benefit

There is another tax, to become effective January 1, 1937, applicable to both employer and employee. This new tax starts at 1% in 1937, is raised each three years  $\frac{1}{2}$  of 1% until 3% is reached in 1949 and thereafter. These rates apply alike to employer and employee, and are presumably to cover Old Age Benefits, which according to the Federal Act, will be paid by the Federal Government, beginning January 1, 1942.

A series of articles on the so-called Federal Social Security Act, enacted into Federal law in August, 1935. The author, Joseph G. Dingle is well known by his previous articles on bookkeeping and by his close study of our industry. Mr. Dingle does not believe this act as established today is sound. He says—

"The idea of Social Security is not new. It does not come through the accumulation of wealth, nor will it come with the distribution of wealth. At one time a large portion of our people enjoyed a large measure of social security. They were the slaves of the Old South. When a black child was born, it was assured food, clothing and shelter until the day of its death. We, too, perhaps can obtain that degree of "social security" if we accept the present law as it is now written. The act is specific in its money raising clauses, but vague in its benefits and application. I suggest that every employer and employee study the act—even the 'fine print'."

These taxes, and the law itself, will be discussed in detail in later articles but, for the guidance of Artisan Readers, it is felt that a brief summary of these taxes and their relation to current business operation is timely. Certain costs

are involved; detailed wage records must be kept; and, above all, it is felt that both employers and employees should seriously study this Act.

### Tax Is on Wages

These taxes are not based on income; they are not to be paid "out of profits." They are levied on wages paid, and on such a base are quite likely to be paid out of capital. In the sheet metal industry, labor is a large item in the cost of a finished job. If, for instance, the cost of a job is composed of labor  $\frac{1}{3}$ , materials  $\frac{1}{3}$  and over head and profit  $\frac{1}{3}$ ; then a tax of 1% on labor is equivalent to a tax of  $\frac{1}{3}$  of 1% on the Sale Price. In 1937, the employer will pay a total tax (under the Federal Act) of 3%, which, in the illustration above, will be equal to 1% on the Sale Price. To these Federal taxes must be added State taxes as and when levied.

It is recommended that employers have all employees fill out information cards, similar in character to the one illustrated here. These cards should be available for every employee on the pay roll, beginning on Janu-

(Continued on page 92)

NAME, IN FULL.....	NO.....
ADDRESS.....	
PLACE OF BIRTH.....	
DATE OF BIRTH.....	AGE.....
CITIZEN..... NATURALIZED.....	
YEARS IN U. S.....	IN STATE..... IN COUNTY.....
UNION AFFILIATION, IF ANY.....	
TRADE OR OCCUPATION.....	
(Signed).....	
DATE.....	20608—ILLINOIS OFFICE SUPPLY CO. OTTAWA, ILL.

It is suggested that every employer have his employees fill in a card like this. Such a record will answer all present questions or requirements.

# Better Weather Protection— Ornamentation

A series of illustrated reference sheets selected from recommended practices in use in the industry. The facing page shows details of methods for keeping moisture out of balustrades, cornices, parapets, and other ornamented sections.

**I**N the February issue we showed, as a part of this series, some recommended methods for flashing copings and low parapet walls. Such a discussion is not complete without also showing common practices for protecting such ornamentation as cornices, balustrades, high parapets and those other "toppers" which used to be so popular.

Just a month ago workmen began to repair one of Chicago's oldest and best known cornices (stone) because the original construction for weather protection had disintegrated permitting water to enter the cornice and greatly endangering passers-by. In view of the fact that this cornice is twenty-two stories up, any bits falling will be serious.

This month's series of details is presented because we feel that in the near future the industry should find considerable alteration work on such older buildings as have these ornamented sections.

## Balustrade

Fig. 1 shows a suggested method for flashing the base of a stone balustrade surrounding a balcony. Oftentimes such balconies are of large area and the flooring acts as a gutter and is covered with metal. Alongside the inside wall the floor metal is turned up and cap flashed from a reglet as shown. If the outside base is more than 12 inches high cap flashing can be used. Where the balustrade base is 12 inches or less the flooring sheet can be carried up and caulked into the base reglet. Floor sheets should be flat locked and soldered. Inspection of leaking roofs should include

careful checking of floor seams for breakage from traffic and cleaning of drains to insure standing water being carried away.

## Wood Bases

Fig. 2 shows flashing methods for a wood base which rests on or penetrates a composition roof laid over wood. Proper flashing should consist of a metal collar turned up around the base and cap flashed under the wood of the balustrade moulding. The collar should extend over the roof at least six inches and be set in the layers of composition. It is recommended that the collar be clear of the wood one-half to 1 inch to prevent rot. The parts of the cap and collar should all be soldered together.

## Copings

In Fig. 3 is shown a typical walking tile deck behind a low coping and in front of a set-back wall. Around the coping a cap flashing should be brought out of a masonry joint and turned down over a base flashing which is inserted into the water-proofing membrane under the tile. A similar construction is employed around the base of the set-back wall. If a floor drain is used it should be flashed as shown. This construction removes the need for absolute water-tightness in the vertical tile and constructs a water-tight box to hold water should the drain stop up.

## Mouldings

In Fig. 4 is shown a flashing recommendation for those newer types

of buildings where a small ornamentation is used below the coping. This moulding is not really a cornice, but possesses all the water penetration characteristics of a true cornice. Through wall flashing is suggested under the coping cap, carried over the back side of the coping wall as shown and either used with an inside base flashing or used as a cap flashing over the composition roofing of the deck.

## Cornices

On many older buildings a heavy cornice is used part way up the building with the exterior wall continued on up. Usually such cornices serve as fronts for a gutter as shown in Fig. 5, in which case the gutter and the cornice must be flashed. From a reglet along the top of the cornice the metal is carried down into the gutter and flat seamed and soldered with the gutter bottom sheets. The metal is then continued up the exterior wall and acts as the base flashing for a cap which is brought out of a reglet or out of a masonry joint as shown. It is suggested that the exterior wall cap be turned behind about one inch for stiffness. The base flashing should be higher than the top of the cornice so that the water will spill over the cornice and not seep into the building wall should the drain stop up.

On narrow gutters a soldered and locked seam is sufficient, but on wide gutters with more than one longitudinal seam, the seams should be cleated as well as locked and soldered.

## ORNAMENTATION

Ornamentation (no matter what the materials) must be carefully flashed. While modern buildings use little of the elaborate ornamentation of a few years ago, public buildings are still ornamented and there will always be repair work on older structures. These drawings show protective measures for common types of ornamentation.

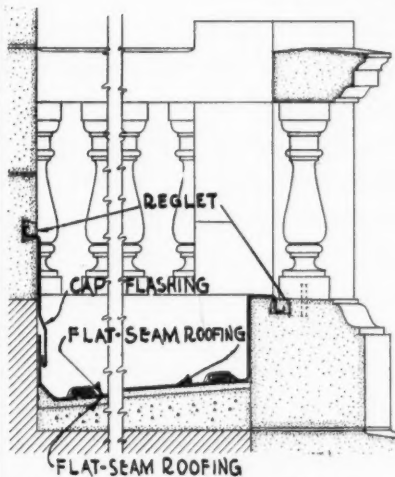


FIG. 1 FLASHING FOR A STONE BALUSTRADE.

Above—Where balconies have metal decks, care must be taken to lock and solder metal of ornamentation, decks, set-back walls.

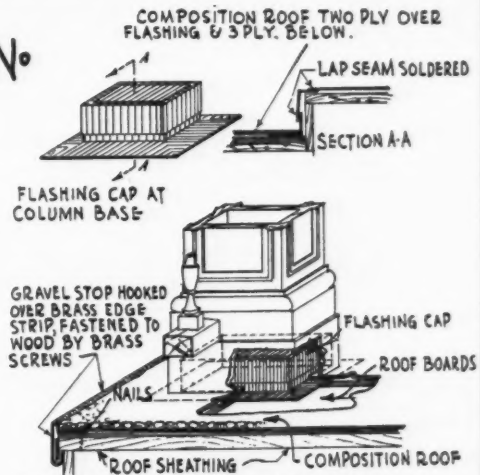


FIG. 2 FLASHING FOR BASE OF WOOD COLUMN OR BALUSTRADE ON ROOF OF DECK.

Above—A ticklish spot—around a wood balustrade. Here is a recommended method.

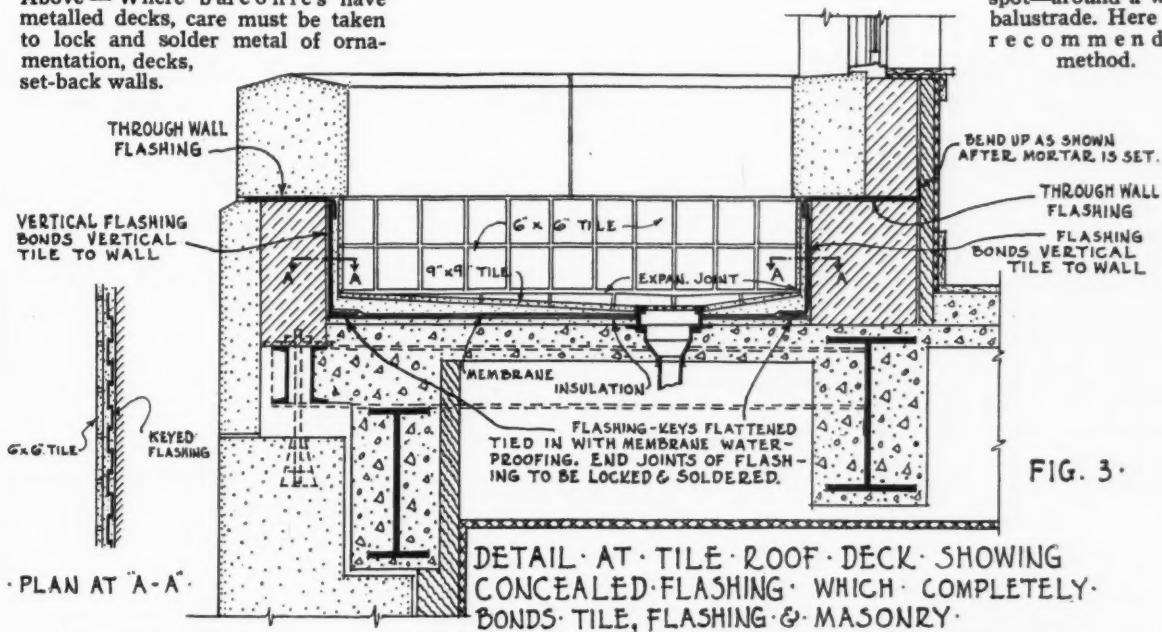


FIG. 3.

DETAIL AT TILE ROOF DECK SHOWING CONCEALED FLASHING WHICH COMPLETELY BONDS TILE, FLASHING & MASONRY.

Above—Recommended flashing for a walking tile deck between a low coping and a set-back wall. See notes for special details.

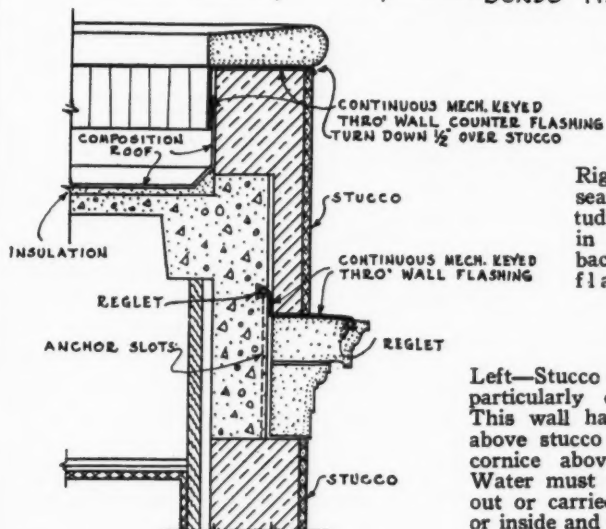


FIG. 4 DETAIL AT PARAPET STUCCO FACE.

Right—Standing seam reglet, longitudinal soldered seam in gutter and set back wall reglet flashing above a cornice.

Left—Stucco walls require particularly careful flashing. This wall has a coping cap above stucco and a masonry cornice above more stucco. Water must be entirely kept out or carried to the outside or inside and not permitted to gather behind the stucco.

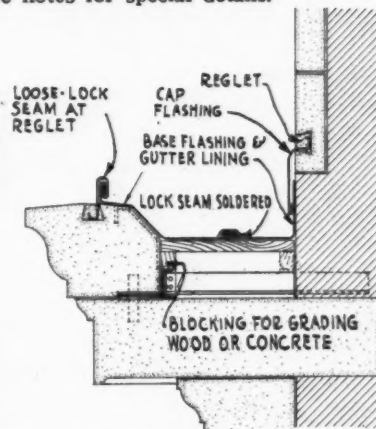


FIG. 5 FLASHING CORNICE AND GUTTER.



# Welding Procedure for the Sheet Metal Shop

By J. Carl Wilson

A series of practical articles covering accepted welding practice for light gauge sheet and light structural shapes as used in the sheet metal shop for the fabrication of metal specialties, ventilating work, or general architectural practice. This third article discusses types of seams and jigs used in the welding of tanks. The sketches on the opposite page show practical methods for fitting up and labor saving ideas for assembling and welding.

## Tanks, 16-Gauge, Lap Seam

**T**HERE are more than 17,000 sheet metal shops in the United States. Most of them have experienced a declining profit and keener competition the past few years even with our varied business. It is varied owing to the fact that our products are used in the construction and repair of practically every type of industry. Still we can, with the addition of arc welding diversify our business still more and at a better profit. There is between the sheet metal shop and the boiler shop a large field that has been neglected to a certain extent, that is 10- to 16-gauge metal. The average sheet metal contractor apparently seems to be afraid of this type of work, and the boiler shop does not care for it as it usually isn't very large, therefore competition isn't so keen in this field and has made it possible for many shops to keep going when they would have had to close otherwise. When business is slow, and profits are down, we blame everything for it, but fail to, or are afraid to, analyze our problems. With some forethought and study of our customers needs, we can make more markets.

We have discussed selling to some extent in previous articles, but less we forget the extreme importance of that part, let's know what we are selling. That is extremely important. We are selling our customer something he doesn't know much about. He may have heard of arc welding, but he doesn't actually

know much about it, therefore don't let him ask questions you can't answer to his satisfaction. In other words, it is necessary to know something about welding before trying to sell it.

### A 16-Gauge Tank

Fig. 1, is a 16-gauge, lap seam, double-welded tank. All seams are double welded, but are not necessary for strength, although they make a neater job and can be fabricated faster than rivets and solder.

Fig. 4 shows  $\frac{1}{2}$ "x4"x10' iron bar set in floor for welding flat sheet and straight seams. In assembling your tank rings it is necessary to keep one edge straight and tack weld the seam, then lay it over the bar and weld. Leave about  $1\frac{1}{2}$ " of these seams unwelded at bottom. Fig. 4 shows jig for holding the ring while last seam is being welded. It consists of a piece of pipe, single pulley and rope. These seams can also be made on jigs shown in previous articles, but are rather large for that type of jig.

### Fitting Up

Fig. 2, shows stiffener ring, made from  $\frac{3}{4}$ " or 1" pipe with plugs welded in ends and tapped for right and left hand threads, see detail G. In assembling this tank, our tank rings are welded and a stiffener ring placed at one end. We fit the bottom, see detail C, and tack weld it, then turn it over and fit the next

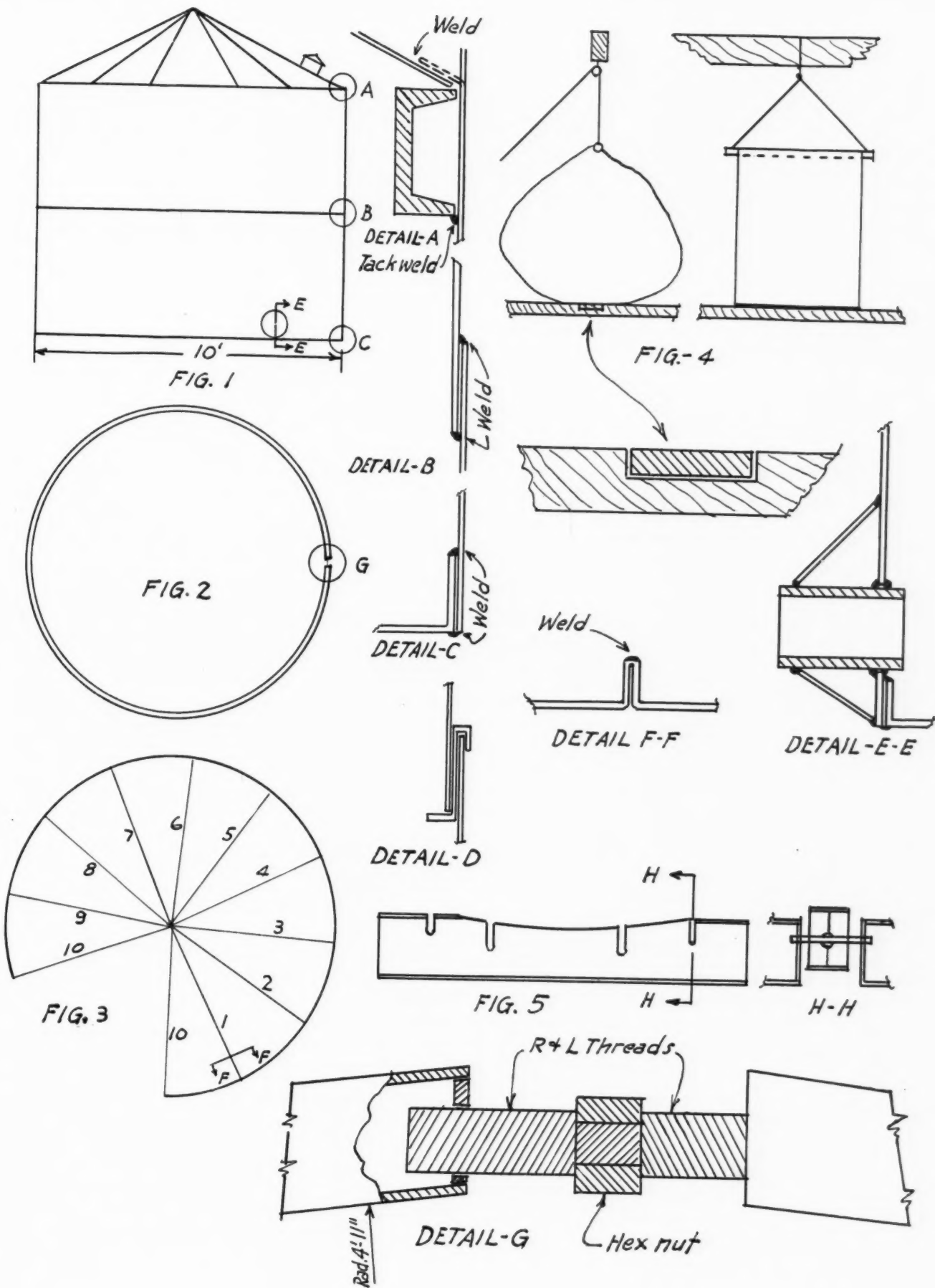
ring. It is better to have at least one stiffener ring for each tank ring. See detail D of clip for fitting second ring. Have 6 or 8 of these, and put them around the edge of first ring. Now drop your second ring inside, and raise your stiffener ring as shown in detail B, this seam is now ready to tack weld. Proceed with next ring in same manner. It is better to leave stiffener rings in until the welding is complete.

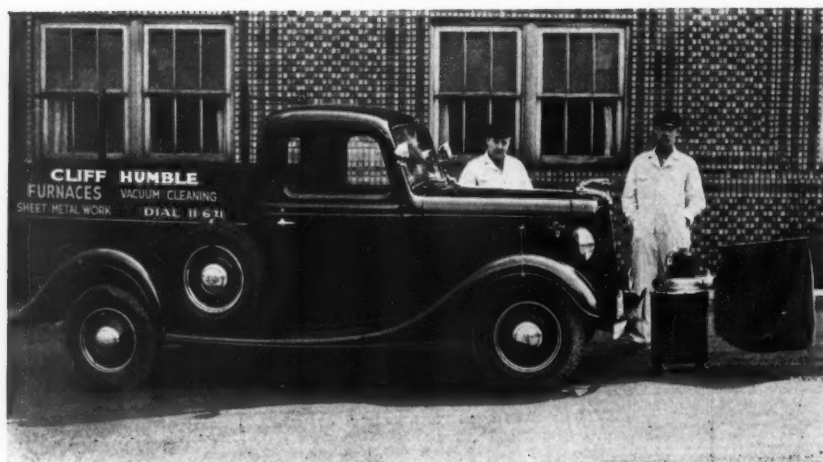
Detail A: Note stiffener ring is  $\frac{3}{4}$  or 1 inch channel iron welded 2" every 14", and left in to support the roof. After the tank is all fitted and tack welded it is better to turn the tank on its side to weld. If we have a great deal of this type of work it is well to have rollers to turn the tank on, see Fig. 5, and Detail H-H. For fittings and boss see Detail E-E.

### Pitched Roof

Pitched roof (see Fig. 3) weld seams 1 to 9 in flat position as shown in Detail F-F, then pull seam 10 together, and clamp with C clamps and weld. The roof is now ready to assemble on tank, see Detail A. After completion if this tank is galvanized iron, clean the welds well with a wire brush, and paint with aluminum paint.

It is to be remembered that all welds have two or more ways to be fitted, and one of them is the better, from the standpoint of economy, ease, and speed of fabrication, therefore we must use some ingenuity in designing, and fitting.





Cliff Humble is the man at the left. The new V8, the cleaner and the jumpers illustrate the statements of Humble.

## "If Your Furnace Smokes C Humble"

"WHEN I first started cleaning furnaces with a vacuum, I operated a 1924 model T Ford. One year later I had made enough money to purchase a used new model and ran that two years. In 1935 I had made enough money (in cleaning) to purchase a new V8 and this year I am buying another. This is what furnace cleaning had meant to me."

The above, in brief, outlines the experience of Clifford Humble, sheet metal and furnace dealer in Brazil, Indiana. He says also—

"Compared with years when I could not see any profit in furnace cleaning, my experience these past few years has convinced me that cleaning is a simple, but sure, plan to build customer good will and steady year after year work and profit. The reason why cleaning does not pay a profit to some contractors is, I think, because these contractors do not appreciate the salesmanship involved in a cleaning service.

"For example I keep my truck as clean and shiny as any undertaker's ambulance. People often stop me to ask how I find the time or the money to keep the truck so shiny. Elbow grease, I tell them. Actually, keeping the truck clean has been, I am sure, one reason why women ask me to clean their furnace year after year. They feel that if I keep my equipment so clean I must do cleaning without muss and dirt.

"In the same manner we keep our vacuum cleaner equally clean and shiny. No matter how rushed we are, or how many jobs we do a day, we always find time to clean the machine before we enter the next owner's basement. Our mechanics put on clean coveralls every day and if a particularly dirty job is encountered they may stop in at the shop before going to the next job and put on a fresh suit.

"So far as I can see about seven out of every ten furnace men never

think to clean up their equipment or put on clean overalls when they get to a job. Some of them never even think to wash their face. Any housewife hesitates to turn over a clean house to a man who seems to have more dirt on his clothes than there is in the furnace. On a dollar and cents basis, I'm sure our policy of coming onto the job clean has increased the acceptance of our service at least 100 per cent.

"I have a sticker that I paste on every warm and cold air pipe with a record of the day the furnace was

(Continued on page 91)

### SAVE YOUR FURNISHINGS WITH A CLEAN FURNACE



**STOP THAT OFFENSIVE ODOR IN YOUR HOME**  
Let us save you work. It's the dirt in your registers and the circulating ducts of your furnace that deposits on your drapes, decorations and furnishings. WE REMOVE IT, together with all soot and ashes from your radiator and smoke pipe.

**Clifford T. Humble Sheet Metal Works**  
426 Vermont St. Brazil, Indiana

Detach and Mail Card Today—No Postage Required

Without cost or obligation to us you may inspect our furnace and tell us more about your modern suction method of cleaning.

Name \_\_\_\_\_  
Phone \_\_\_\_\_ Address \_\_\_\_\_

One side (and in adjoining column other side) of a cleaning mailing card.

This Card Will Save You Money



### Why Your Furnace Should Be Cleaned

Do you know that soot will rust your furnace castings and eat the smoke pipe? Soot will insulate heat like asbestos with consequent loss of heat and waste of fuel. A clean furnace insures economy in every way. A clean furnace makes a clean house. At present low prices for cleaning you cannot afford a dirty furnace.

MAIL THE CARD TODAY—NO STAMP REQUIRED

MAIL THE CARD—NO POSTAGE REQUIRED

Postage Will be Paid by Addressee

Its Postage Stamp Necessary If Mailed in the United States

**BUSINESS REPLY CARD**

FIRST CLASS PERMIT NO. 9 (REG. MAIL) P. O. BOX 100, INDIANA

**Clifford T. Humble Sheet Metal Works**

426 Vermont Street

Brazil, Indiana



# The New York State Convention

THE thirteenth annual convention of the New York State Sheet Metal, Roofing and Air-Conditioning Contractors Association, Inc., (the first meeting held since the change in name and new incorporation) held April 27, 28 and 29 in Syracuse, indicated in a striking manner the changes which have come about within the industry during the past year.

Contractors, generally, from all parts of the state, reported largely increased volume of business, larger individual contracts, increased competition, some difficulty with the labor situation, but such a good winter and such excellent prospects for the coming summer and fall that the entire air of the convention was optimistic. Further, indicating increased volume of business was the fact that many of the contractors could not find time to stay for more than one or two days of the meeting.

## Exhibits

Manufacturers, likewise, indicated optimism by purchasing all available space at the meeting and spilling over into the lobby and adjoining rooms. More attractive exhibits and more time and money spent on individual exhibits were indicated everywhere. A number of air conditioning furnaces in beautiful cabinets, one or two such units being shown for the first time this year, gave some indication of the progress made by air conditioning. The tool manufacturers, sheet metal manufacturers, accessory manufacturers, special machines, such as welders, and of course the pipe and fittings and register manufacturers each had on display the latest and most improved items in their line of products. It might well be said that the display gave a quick but thorough picture of the progress made in the last three or four years and proved beyond doubt that our manufacturers have progressed greatly.

## Merchandising

Paul B. Andrews, Sales Manager of Revere Copper and Brass, Incorporated, speaking on the subject of merchandising, said that generally there has been too much talk about merchandising and mainly for three

reasons, (1) A realization of the cost of distribution; (2) an awakening to the need of lower cost of distribution; (3) a desire of many persons to have something to say about timely subjects.

Mr. Andrews made the assertion that it is only within the last three years that our industry has established authentic cost data for distribution. He emphasized that the retailer tries to get 50 per cent, the wholesaler 25 per cent and the manufacturer must also get something. These costs of distribution add considerably to the initial cost of production and under present competitive conditions it is essential that costs be reduced wherever possible. Mr. Andrews said he feels that it is up to all industries to correct the statement of publicity seekers who openly declare that cost of distribution and manufacture are too high. Furthermore, such publicity seekers point to chain stores as one example of the reduction in distributing cost, whereas actually most of the reduction in prices has come about through reduced profit on manufacture and reduced sales expense.

## What Is Merchandising?

"Merchandising might be defined as 'the art of selling the most goods for the most money.' There is no magic formula to guarantee selling success, and what might be a good plan for one contractor would not be as good for another. The only way in which a successful plan may be developed is by study and trial and error. Too many merchandisers are only trying to hold a job by means of spectacular stunts. It is surprising how many businesses actually have nothing to sell, or have something to sell but no one to sell it. To be successful it is necessary to study and know the area, the prospects, their habits, their income, in short all the data available for the trade area. If possible have a product which is different—which has real sales talking points. Eliminate dead items. Don't base conclusions on hopes that are not actual facts, and if your campaign does not work successfully, discard it immediately. Each part of the finished program must have

its place and its allotted amount of money, or one phase of the plan will run away from the others. Fast turnover of goods helps to increase profits and reduce expenses. Cheap items are bought; expensive items are sold. Any reduction in the cost of selling cheap items increases the profits as for example the small items displayed in hardware stores. No campaign can be successful forever, but while a successful campaign is running, it should be played to the limit. It is becoming increasingly necessary for manufacturers, jobbers, dealers and all other individuals to co-operate in order that our industry or any industry shall get its fair share of the consumers' spending dollar. The mail order competition may turn out to be an object lesson, because the mail houses have shown many of us how to merchandise."

## Oil Burning Units

H. F. Randolph, sales manager, International Heater Company, speaking on the subject "Relationship Between the Air Conditioning Contractor and the Oil Burning Dealer," stated that the Oil Burner Show held at Detroit was actually a display of heating equipment and not a display of burners. 1935 produced an all-time peak for oil burner sales and 1936 looks still larger. "Generally speaking," declared Mr. Randolph, "the oil burner salesman as we know him today is a merchandiser and he does not think in terms of engineering. Vice versa, the furnace contractor is an engineer and seldom thinks in terms of merchandising. The situation is complicated by the fact that the combination furnace and a matched burner has entered the field, and so far as the purchaser understands, the unit is made completely and guaranteed by one manufacturer. The demand for this type of unit seems to be growing. The oil burner dealer who installs oil-burning furnaces must have a sheet metal department and the furnace dealer must set up and operate a sales and service department. In some large cities services are available to set and service burners, but in the small cities the furnace man must carry the entire load. A

successful plan is the co-operation between furnace contractor and oil burner dealer wherein the furnace man sets the furnace and installs the system; the oil burner dealers sell and install the burner; and the heating contractor takes the guarantee."

#### Contractors' Experiences

As the result of this brief talk, several contractors asked for discussion and outlined plans which they had used as for instance one contractor said his firm has sold several hundred burners and discontinued the sale because the service expense eliminated all chance for profit. Another contractor said that he, likewise, had sold burners but found that the service and sales did not justify the expense. One contractor said that he had attempted to establish a service bureau for all furnace manufacturers, but found that only one oil burner manufacturer would permit them to purchase factory parts. The discussion seemed to indicate that under present conditions the most satisfactory arrangement is for the furnace installer to sell the furnace and install the heating system with the oil burner dealers selling the burner and servicing it. The furnace contractor carries the guarantee and services the heating plant.

#### A. C. Competition

Under the subject, "Today's Competition in the Air Conditioning Field," H. T. Richardson, Vice President, Richardson & Boynton Co., New York, outlined briefly the campaign of the radiator people, consisting of popular magazine advertising, radio advertising, and the distribution of several interesting booklets. Mr. Richardson pointed out that these booklets emphasized the fact that air conditioning is eighty per cent heat, and that once the home owner has satisfactory heat, he can add phases of air conditioning to the limit of his purchasing power. The chief problem to be considered by our industry is the fact that the home owner knows too little about air conditioning and generally considers conditioning in the light of experience with cooling systems such as those in theaters, restaurants, etc. "Air conditioning was our baby and should continue to be our business," declared Mr. Richardson. "The entire industry

is slowly organizing itself to keep air conditioning within our field. The manufacturers are conducting courses, and all interested contractors should take advantage of this instruction. Another interesting development is the rapid increase in the number of oil-burning furnace units. It is too early to predict just how this industry is going to be handled, but it is safe to assume that the purchaser of air-conditioning equipment will want to eliminate hand firing and for this reason oil, gas and stokers will undoubtedly assume increasing importance."

#### Social Security

The Monday evening session saw the beginning of the discussion of the Social Security Act. J. D. Wilder, editor of AMERICAN ARTISAN, discussed the general aspects of the present law and pointed out some of the problems which must be solved before the act can be effective. He explained the ten major divisions of the act emphasizing that old age assistance, old age benefits and unemployment compensation are the three divisions which should have our

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serious consideration. Objectors to the act point out the whole bill may be declared unconstitutional, and, secondly, that this law seriously affects state rights; also each employer under unemployment compensation and old age benefits must be identified in some manner and the problem of properly identifying

25,000,000 people is a chore of serious proportion. The taxes to pay for unemployment compensation are already in effect. At present one per cent of wage is paid for 1936, 2 per cent for 1937 and 3 per cent for 1938 and thereafter. These taxes are to be applied on total payrolls and will probably not come out of profits and will eventually amount to a considerable sum. In addition to the Federal law, states have different regulations as to the number of employees which must be employed in a shop before the tax is paid. In some areas, the number of employees is one or more, in other areas four or more, while the Federal law states eight or more. In order to pay the tax, the employer must have in his employ the number of employees listed by the state and Federal law during a period of twenty weeks in any one year.

#### Old Age Benefit

The old age benefit act begins January 1, 1937, and increases one-half of one per cent during each three-year period until 1949, when the tax becomes three per cent. This act is paid equally by employer and employee.

The speaker read various sections of the act and discussed the problems raised by these sections, such as who is an employer, who is entitled to benefits, the restrictions, waiting period, length of payment, and other parts of the unemployment compensation bill.

#### An Example

In order to make this act understandable, Mr. Wilder cited the case of a young man now 25 years of age who works for forty years at \$100 per month. In 1977, when the man is 65 years of age and is entitled to old age benefit, the employee will have paid in taxes of \$1,260, the employer \$1,260, total \$2,520. The employee is entitled to a total monthly pension of \$51.25. The speaker declared that actuarial figures indicate that very few workers ever average \$100 per month for a period of 40 years, and that therefore the \$51.25 may be cited as a fair average pension. The speaker presented for discussion and reference several tables showing a summary of state unemployment compensation acts now in effect indicating

(Continued on page 94)

VOTED





# AIR CONDITIONING SECTION

**W**E call attention to three articles in this month's section relating to the timely subject of cooling. First the article by S. Konzo on the proper location of registers for cooling. Mr. Konzo has assembled the different opinions now prevailing and has drawn upon actual test data to show which location is BEST, and also what is PRACTICABLE.

- - - Actual results from operating systems are always valuable. M. W. Pehl explains the design of a residential cooling system, shows the results obtained, and gives costs of apparatus and operation.

- - - Some of the best suggestions for figuring the cooling load to account for all the heat gains are presented by a group of engineers in the first of a three-part article outlining a method for determining the cooling load. These articles discuss sources of heat, heat storage, time lag, sun effect, windows and awnings, and show a suggested data sheet.

# MERCOID FAN AND BLOWER CONTROL

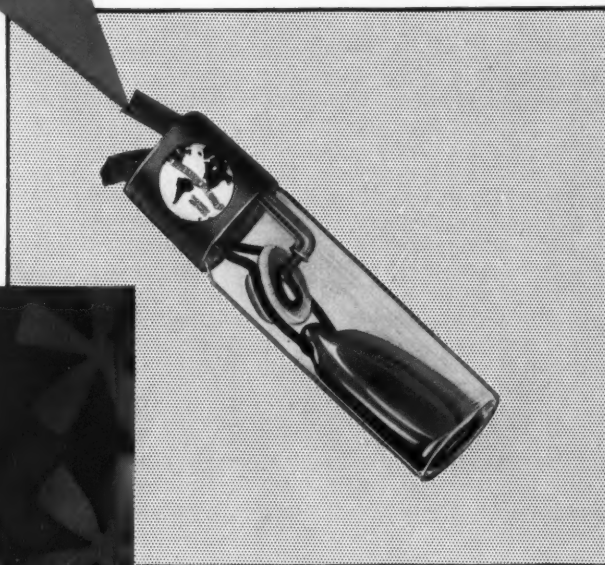
This instrument is generally recognized as standard in the warm air heating field. It has many exclusive features. The dial and indicator show the temperature in the furnace hood. The double adjustment makes it easy to set the "low" and "high" operating points, which are plainly indicated on the dial. The adjustable flange facilitates a quick and correct installation. There are many other desirable mechanical features. This control is built to give dependable service over a long period of years. Satisfaction assured.

*Write for Bulletin No. 230-T and also Catalog No. 100-T*

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IT CANNOT BE AFFECTED BY  
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THE MERCOID SWITCH WILL  
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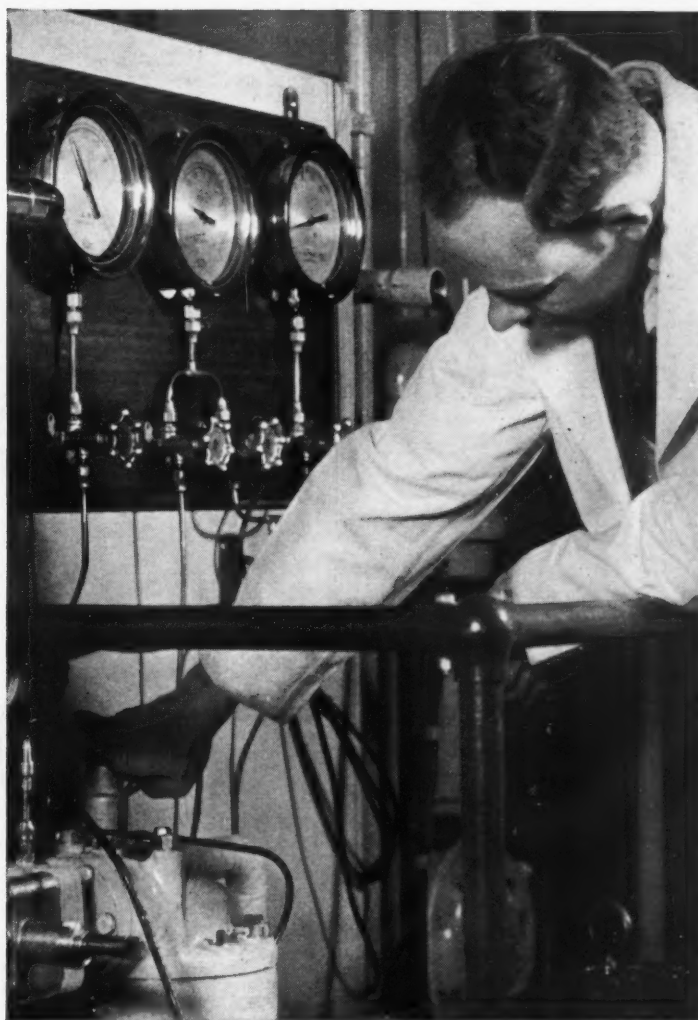
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AIRTEMP, INC.  
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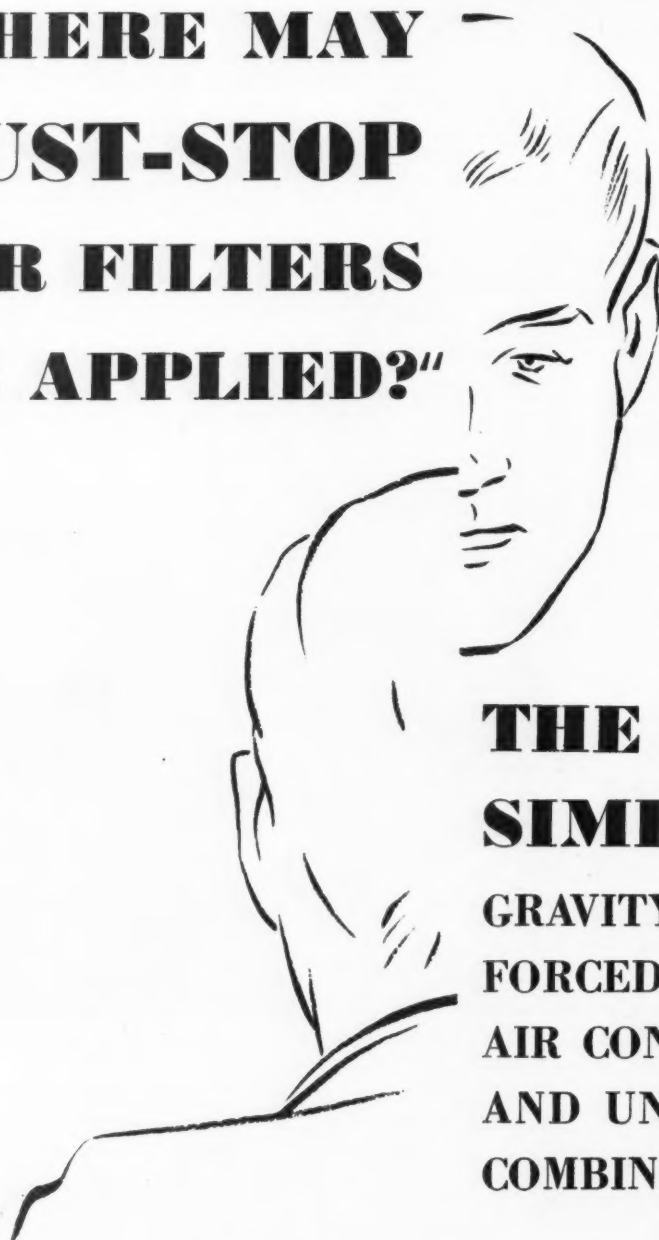
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*Equipped with ready  
assembled Rotary  
Wall Flame Type  
OIL BURNER*

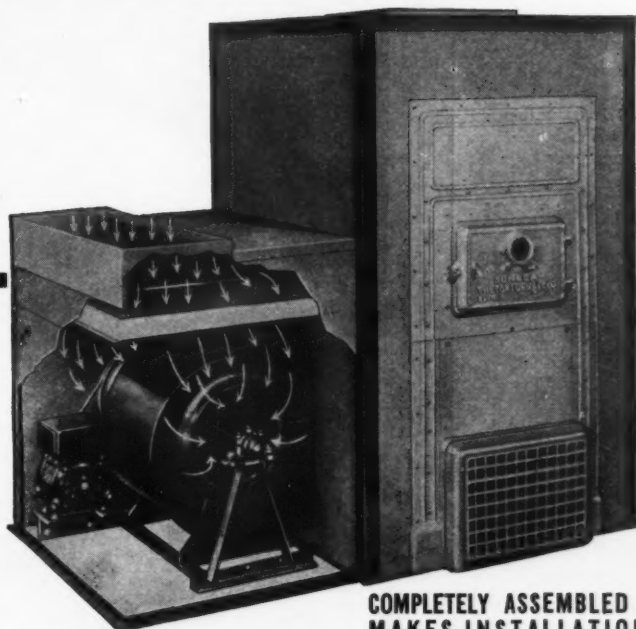
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MAKES INSTALLATION EASY**



1. Oil burner arrives complete.



2. Slides easily into steel heating element.



3. Oil burner assembly installed.



4. Lower front panel goes into place.

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1. First monthly payment can be deferred until September 30.
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3. No increase in F.H.A. approved financing charges, for deferring payments.
4. No recourse—no holdback; dealer receives all his money when installation is completed.

*Make sales now! Keep busy all summer! Return the coupon for complete information.*

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WARM AIR FURNACES AND  
AIR CONDITIONING UNITS

THE FOX FURNACE COMPANY  
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A-5



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FLOOR TYPE DeLUXE  
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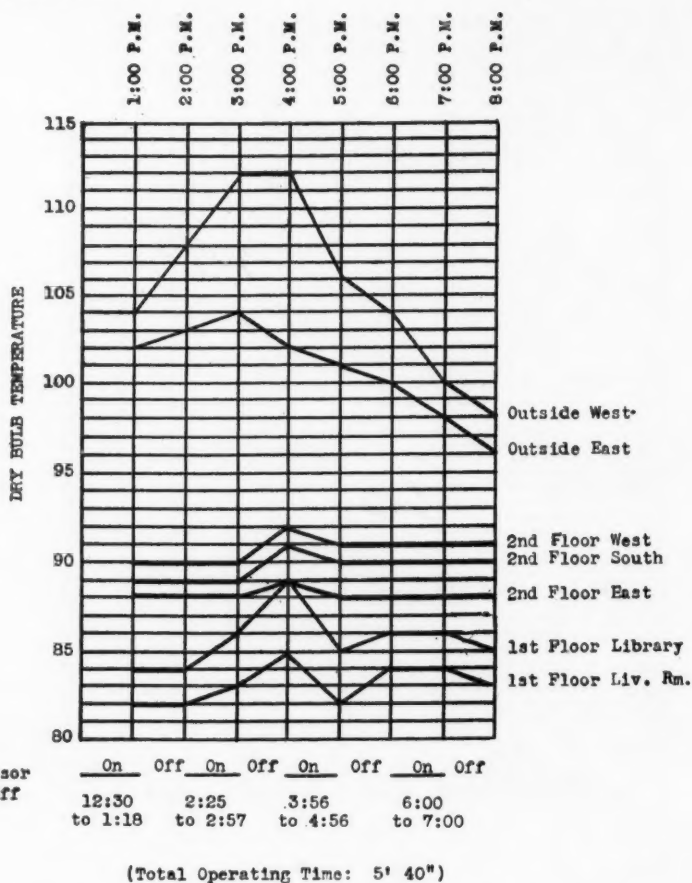
The chart of a test run July 10 on the previous page shows that outside air enters at 98°, mixes with basement air dropping to 84°, passes through coils further reducing to 62°, picks up temperature between coil and register leaving register at 67°, cools the room and re-enters the basement at 84°. The chart on this page of a test July 16 shows temperatures throughout the house during "on" and "off" cycles of the compressor and the movement of temperature during a period of about 6 hours.

metal baffle plates riveted to the side of the duct to fill up the margin between the coil and the duct.

For this installation the compressor connected to a copper fin type expansion coil by means of copper tubing. Expansion valves and a pressure switch with a high and low pressure cutout, a magnetic electric safety switch and a water regulator valve were included in the installation.

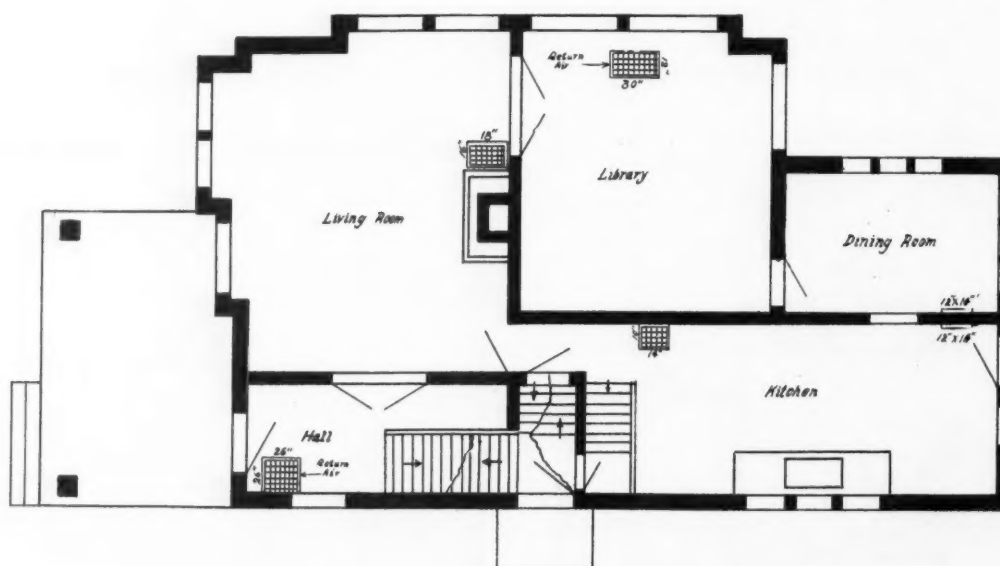
Work of installing this equipment was started in the last week of June and on July 10th a test run was made; then on July 16th another test was run, with results as shown in the charts attached hereto.

After the operation of the tests, the writer and the owner of the residence (who, incidentally, became very much interested in the subject of summer cooling) started to see what improvements could be made. First, the return air from the first floor which had been carried across the ceiling of the basement and left to dump the air literally over the fan intakes, was taken down for two reasons: one was the loss of air due to friction, and the other because of the appearance of the shallow galvanized duct hung from the ceiling. After this duct



NOTE: The rise in temperature (1st Floor) at 4:00 P.M. was due to gas range in kitchen being in use, and the compressor being off at the same time.

had been taken down, the ceiling was covered with wallboard laid off in panels. This improved the appearance of the basement very much besides providing a better means of returning the air to the basement. There were three return air registers in the ceiling of the basement, two coming from the



The first floor plan shows the two return faces (hall and living room) the original return pipe from second floor (through kitchen) and the location of registers.



## AIR CONDITIONING SECTION

May, 1936

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first floor and one from the second floor. The register from the second floor hall, however, was of little benefit.

Two squirrel-cage fans, mounted on a single shaft, driven by  $\frac{1}{2}$  h. p. motor, had been installed as part of the heating system, and these fans delivered approximately 1600 c. f. m.

A push-button manual control was used and arranged so that a single switch located in the library would start both the compressor and the fans.

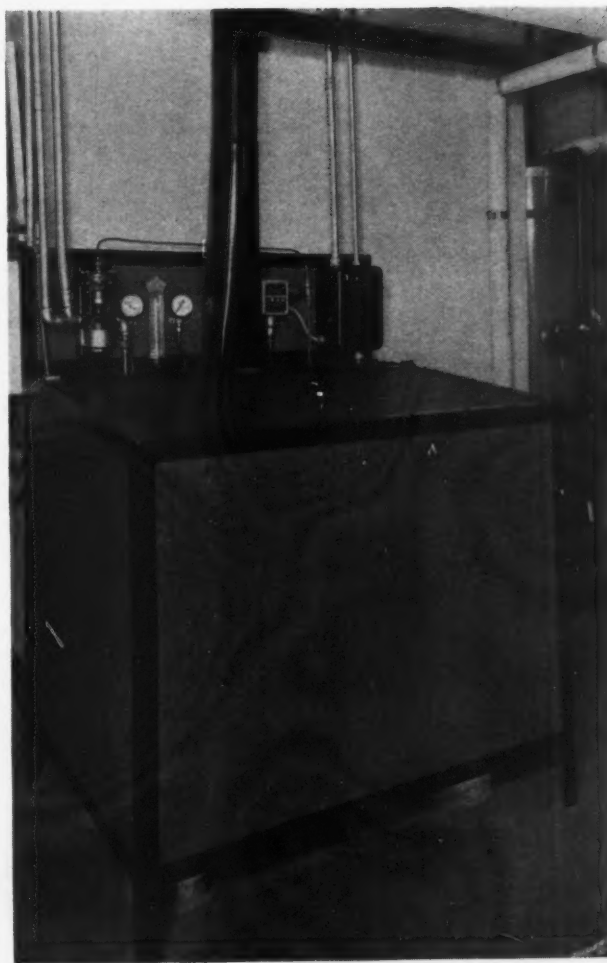
During all the hot days of July, August and September of 1934, this house was kept at the pleasant temperature of 85 degrees dry bulb when the outside thermometer stood at 112.

The owner, naturally, was interested in the cost of operation, so a recording meter was borrowed to measure the amount of electricity used by the cooling equipment. A reading was also taken of the water meter, and the average cost per hour was found to be 13 cents—9 cents for power and 4 cents for water.

Our first set-up included the piping of the condensed water to the sewer—a dead loss. We then considered the problem of using this water for some purpose, and finally decided to pipe it to the rear of the house and connect to a sill cock. A garden hose connected to the sill cock sprayed this water over the rose garden or the lawn. We first thought that water at 110 degrees would be too hot to spray over the grass and flowers, but we found that by spraying the water through a nozzle, the water temperature dropped to 82 degrees by the time the water fell to the earth.

### Attic Cooling

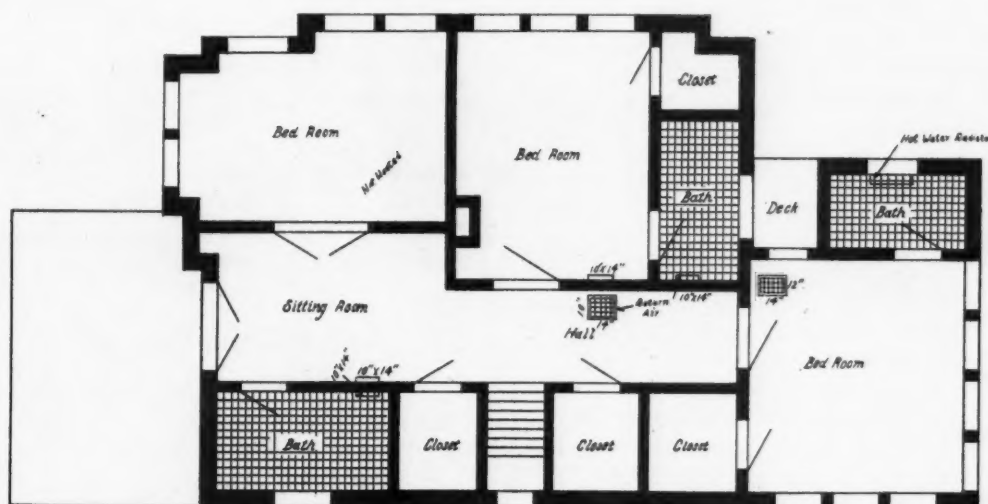
Then we found that the second floor was always about six degrees warmer than the first floor. This, we found, was due to the fact that the warm air on the second floor had no way to return to the basement except one small return air duct in the floor of the hall on the second floor, and this did not function at all. We then tackled the problem of getting the warm air out of the rooms on the second floor and we solved this by installing two ventilating units of galvanized iron that took in two valve registers we installed in the ceiling of these rooms. In these ventilating units, we installed a propeller type



Compressor, motors, fans and coils are housed in this cabinet made of angle iron and presswood to eliminate danger and reduce noise. All instruments are mounted on the backboard. (See text.)

electric fan and carried a 16-inch round duct through the roof of the house. The top of the ventilating unit was in the form of a hinged cover so that air could be exhausted from the attic by closing the ceiling register valve by valve and lifting the cover of the ventilating unit. Approximately 1000 cubic feet of air per minute were handled by these two fans. In actual operation, these ventilating units

(Continued on page 71)



The second floor plan shows the original return face in the hall. The ceiling registers in bed room lead to the attic ventilating fans. Air does not now go to the basement from this floor.

# Forced Air Heating Facts From the Research Residence

By S. Konzo

Special Research Associate  
Engineering Experiment Station  
University of Illinois

## Registers—for Summer Cooling

### Introduction

**T**HE choice of suitable locations of registers in installations designed exclusively for summer cooling, exclusively for winter heating, or for combined summer cooling and winter heating is dependent on a consideration of a great number of factors. It is well to recognize that there is no single location which can be regarded as being the best for all three conditions of service. In this article the author presents a short summary of the many factors which may have to be considered in deciding on a suitable location of registers for any given type of installation.

### Winter Heating Only

In previous articles (see April, 1935; May, 1935, and March, 1936, issues of this magazine) the author has presented a discussion of the advantages and disadvantages of the baseboard and high sidewall locations of the warm air registers for forced-air heating installations. Briefly summarized, the advantages and disadvantages were as follows:

#### Baseboard Location

##### a. Advantages

1. The length of duct is short and offers least resistance to air flow.
2. The drop in temperature between bonnet and register is a minimum.
3. The cost of installation is least.
4. Register is not conspicuous if frame is matched with woodwork.
5. Temperature gradient in room is minimum for register velocities less than 300 ft. per minute.
6. Location is easily accessible to home-owner for shutting off register.

##### b. Disadvantages

1. Baseboard location may interfere with placement of furniture.
2. Unless proper types of register are used the register may look like a "hole in the wall."
3. Objectionable drafts may be created in front of the register, particularly for register velocities exceeding 250

ft. per minute. Diffusing registers which spread the air downwards and also outwards may help in overcoming these draft conditions.

#### High Sidewall Location

##### a. Advantages

1. Location does not interfere with placement of furniture.
2. Register velocities greater than 250 ft. per minute may be used without creating objectionable drafts in living zone.
3. Use of high velocities enables use of small sized and inconspicuous registers.

##### b. Disadvantages

1. Use of longer ducts entails greater resistance to air flow, larger cost, and larger drop in temperature between bonnet and register.
2. Register may not be accessible to home-owner who desires to close the register at night.
3. Temperature gradient in room may be large, particularly for intermittent operation of the fan, unless register velocity is greater than approximately 500 ft. per minute.
4. The air issuing from the registers may cause streaks to form on the ceiling unless the air flow is deflected away from the ceiling surface.

#### Ceiling Location in Middle of Room

**a. Advantages**—Same as for high sidewall location.

**b. Disadvantages**—Same as for high sidewall location, except conditions are more aggravated. The air must not be allowed to "scrub" the ceiling or dirt streaks will be formed.

### Summer Cooling Only

For an installation that is designed for use exclusively for summer cooling, the best temperature conditions in the room will probably be provided when the register, for the cool air being supplied

to the room, is located either at the ceiling in the middle of the room, or at the high sidewall location. The location of the register above the head level will allow the cool air to be distributed at fairly high velocity into the room above the heads of the occupants. The cool air will then tend to settle into the living zone without the accompaniment of objectionable drafts.

In this connection, tests have been reported by manufacturers of registers on the flow characteristics of a given type of register, which supplied air at a temperature of 20 degrees cooler than that of the air in the room. The path of the main air stream is indicated by the group of curves shown in Fig. 3. It may be noted that the "throw" of the air-stream is dependent on the register face velocity. This register velocity must be maintained at a value such that the main air-stream will not be directed onto the heads of the occupants. On the other hand, the register air velocity must not be maintained at such a high velocity that the main air-stream will "rebound" from the opposite wall at a high velocity. Otherwise, objectionable drafts will occur along the lower part of the wall opposite to the register. See Figs. 4a and 4b.

#### Effect of Type of Register

The use of the conventional, non-deflecting type of baseboard register, such as is shown in Fig. 4c may create objectionable drafts directly in front of the register, even for fairly low air velocities, and hence may not prove satisfactory for many installations.

The baseboard location of the register will prove much more satisfactory if deflecting louvers or plates are placed, as shown in Fig. 4d, so that the air is deflected directly towards the ceiling. The main air-stream could be confined within a distance not greater than 18 in. from the wall, and objectionable drafts would not be maintained in the main portion of the living zone.

Another location which has proven satisfactory in some installations is the window sill. The register is placed flush with the sill so that the cool air is directed towards the ceiling. This type of installation may not prove practicable in residence installations, but is adapted to certain forms of

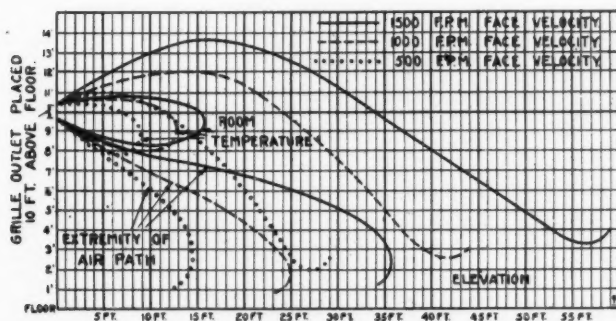


Fig. 3—Chart showing relationship between register face velocity and "carrying" characteristics of the air stream. Courtesy of Hart & Cooley Mfg. Co.

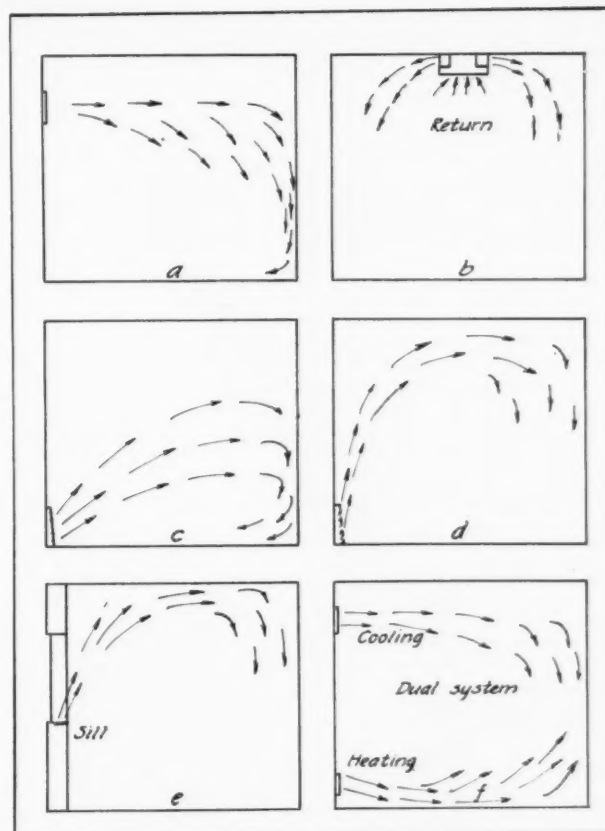


Fig. 4—Composite drawing showing air paths with several common register locations. See text for full explanation.

buildings which have a wide window ledge, below which the ducts can be located. See Fig. 4e.

#### Temperature Gradients in Cooling

In the case of registers to be used in forced-air heating installations, the effectiveness of the register is measured in terms of the temperature gradient produced in the room with the use of the given register. For example, a register which will produce a small difference in temperature between the floor and the breathing level is regarded as more effective than another register which will produce a much larger temperature gradient.

This form of reasoning is frequently applied to the case of registers to be used for summer cooling installations. It is the opinion of the writer that this practice of judging the relative merits of register locations, from the standpoint of the temperature gradients produced in the room, is not entirely justified by actual conditions.

It may be noted from the preceding discussion on register locations for summer cooling installations, that the merits of various locations of the register for delivering cool air into a room have been discussed entirely from the standpoint of the drafts created in the living zone. The reason for this method of evaluating the merits of various register locations may become more apparent if the significance of temperature gradients, in the case of cooling installations, is considered:

1. In the first place, when air at a temperature of approximately 70 degrees F. is introduced

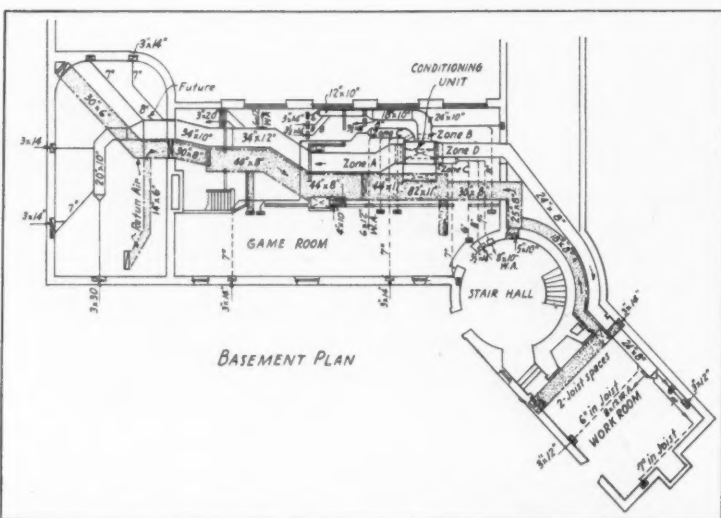
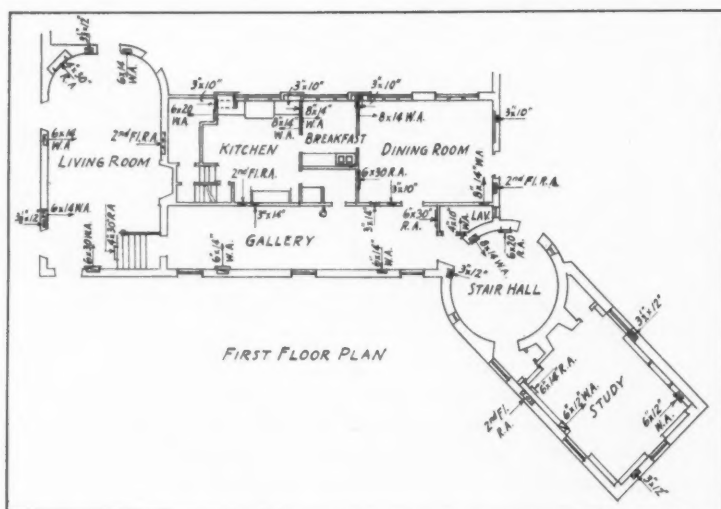
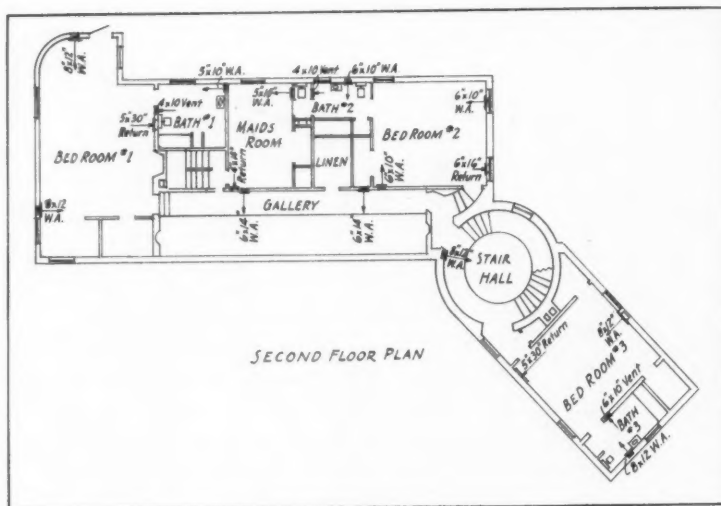
(Continued on page 68)





Above—Exterior of house with study at left and garage (not heated) at right. Below—Basement and floor plans of house showing extensive duct work, segregation of zones, location of registers, returns and thermostats.

# Engineering Data for A Zone System of Operation



**D**URING the past two winters (1934-1935 and 1935-1936) there has been operating in a highly satisfactory manner a gas-fired, zone distribution, forced air heating system in Rochester, New York, which has done much to prove in its area that zone operation is basically sound for the conditions encountered by the heating contractor who installed this system.

Even a brief outline of the conditions which faced contractor George Ballard of Rochester, will show the problems which had to be considered. The house, first of all, is approximately 112 feet long and is laid out along an angle center line of about 135 degrees. The heater room is approximately at the meeting point of the two wings, which meant that supply ducts had to run both ways, each run being at least 50 feet from plenum to register or boot.

## House Construction

The house has two floors heated, plus a game room, work room, stair hall and laundry heated in the basement. The exterior walls are 1-inch stucco, 8-inch cinder block, 1½-inch furring, 1½-inch cork insulation, metal lath and plaster. The roof is clay tile and the second floor ceiling is plaster on metal lath on 1½-inch cork insulation.

The fuel selected was gas, and because the house is so extended and, further, because the rooms are grouped by exposure a zone control and distribution system was thought advisable. Probably the most uncertain area of the house was the two-storied gallery across the front. The first floor of the gallery serves as a passageway from the stair hall to the living room wing. The second floor is a balcony from which open the chamber doors. The large windows are more than one floor high and of considerable area. This exposure, the high ceiling, doors opening off at two levels, presented a real problem in stratification and drafts.

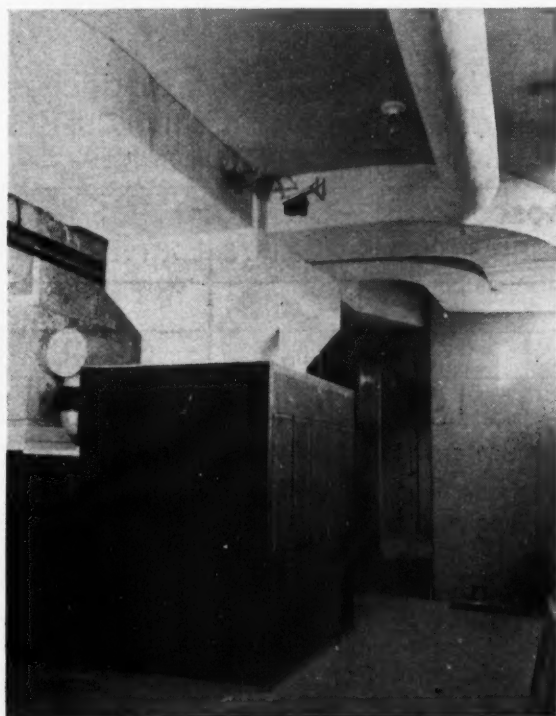
## Zone Arrangement

The stair tower, likewise, is both large and open from ground level to pitched roof. To prevent strong

NAME LOYD A. JONES ESQ. CITY ROCHESTER, NY ARCHITECT ROGER D. Mc PHERSON CITY ROCHESTER, NY DATE 3-21-33  
HEATING ENGINEER \_\_\_\_\_ CITY \_\_\_\_\_ FIG. BY JMP CHKD. BY \_\_\_\_\_  
SUNBEAM AIR CONDITIONING UNIT NO. C-5 C. F. M. 3258 B. T. U. REQUIRED 230798

ROOM DIMENSIONS	CUBICS	INFILTRATION		EXP. WALL	GLASS		NET WALL		EXP. FLOOR		EXP. CEILING	B.T.U.		DUCT LOSS		B.T.U.		TOTAL LOSS		B.T.U.		C.F.M.		SQ. INCH AREA	
		1"	1"		6"	11"		11"		1"		1"	1"	1"	%	1"	TOTAL LOSS	%	1"	TOTAL LOSS		MAIN	BRANCH	TRUNK	
AMUSEMENT RM. 10'5" x 6'5" x 8'0"	4256	12	14	126	3	123	14	532	53	-	-	84	70	5880	6468	6	388	6856	80	21	29	26	31		
TOWER																									
2'14" x 7'0"	1498	36	43	147	36	114	13	214	21	-	-	113	"	7910	8701	4	348	9049	105	28	30	34	52		
WORK ROOM																									
16'9" x 21' x 8'0"	2816	22	26	282	19	263	29	352	35	-	-	111	"	7770	8547	14	1197	9744	113	30	33	36	54		
LIVING ROOM																									
17' x 31' x 11'3"	5929	88	106	810	127	140	683	76	527	90	-	412	70	28840	31724	12	3807	35531	569	149	162	182	27		
GALLERY																									
4'6" x 8' x 9'0"	3366	132	158	374	96	106	278	31	-	-	-	295	"	20650	22715	8	1817	24532	285	75	82	91	131		
KITCHEN																									
13' x 15' x 9'0"	1755	62	74	117	56	62	61	7	195	23	-	166	"	11630	12782	2	256	13038	191	40	43	48	72		
ROOM																									
4'6" x 9' x 10'0"	500	78	94	70	70	77	-	-	50	6	-	177	"	12340	13629	6	1818	14447	168	44	48	54	81		
BREAKFAST RM.																									
8'6" x 6' x 9'0"	729	62	74	77	56	62	21	2	81	10	-	148	"	10360	11396	2	228	11624	135	35	39	43	68		
DINING ROOM																									
20'0" x 14' x 9'0"	2520	124	149	216	137	151	79	9	-	-	-	309	"	21630	23793	4	952	24745	287	75	83	92	138		
LAVATORY																									
6' x 3' x 9'0"	203	4	5	18	6	7	12	1	-	-	-	13	"	910	1001	4	40	1041	12	3	3	4	6		
STAIR TOWER																									
21'4" x 8' x 9'0"	1926	42	50	288	65	72	223	25	-	-	-	147	"	10290	11319	4	453	11772	137	36	39	44	66		
STUDY																									
12'6" x 16' x 9'6"	3525	36	43	384	69	76	515	57	-	-	-	176	"	12330	13552	14	1897	15449	179	47	52	57	86		

Complete data sheet for the installation, including coefficients, safety percentage additions, heat loss of piping, B.t.u. losses and sizes of piping with c.f.m.



**The five section gas furnace (Fox) with bonnet and zone trunks. Two zone damper motors show. All piping is heavily insulated and painted.**

descending cold air currents or stratification at different levels in the well, a register was placed at both first and second floor levels with a return from the first floor.

As laid out with the different problems in mind, the furnace has four main trunk lines off the bonnet. As shown in the plans these main trunks serve zones as follows: Zone A: Laundry, living room (first floor), bed room number 1 and bath room number 1 (second floor). Zone B: Dining room, breakfast room, kitchen (first floor), maid's room, bed room number 2 and bath number 2 (second floor). Zone C: Game room, stair hall (basement), gallery first and second floors, stair hall (first floor) and lavatory on second floor. Zone D: Work room (basement), study (first floor), bed room number 3 and bath number 3 (second floor).

A study of the floor plans shows that these zones were grouped for compactness of area and exposure rather than for types of service or floor grouping. The result is two long trunks which about balance and two short trunks with numerous branches which also nearly balance.

The plans and photographs also show how the main trunks were carried out only as far as practicable with the remainder of the run in around pipe. In this connection all the pipes (rectangular and round) were

*(Continued on page 65)*

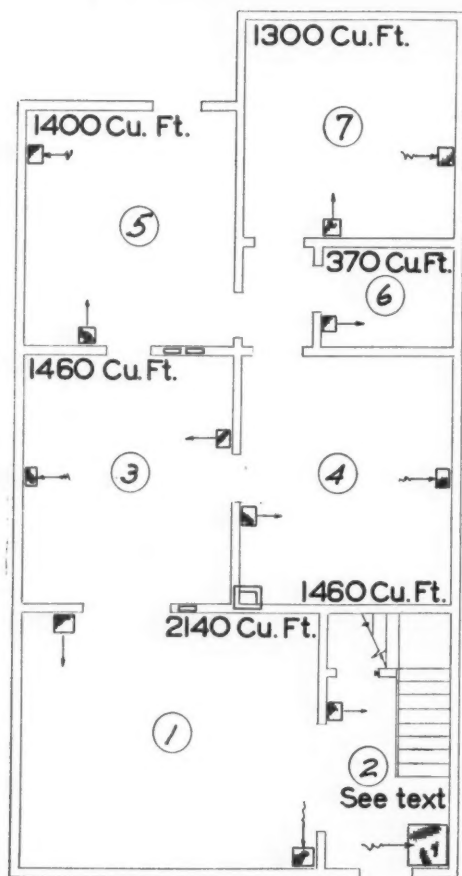


Fig. 1—First floor plan showing inside wall registers and outside wall returns

IN the last article (April, 1936) we considered the extreme case of a small dwelling (Fig. 1) having one cold air return face placed in a remote corner (Hall 2). In the present installment, we'll see how we can change the return air system to provide direct removal of cold air from each first floor room except the bath, and at the same time hold the cost of the new return air system down to the minimum.

In locating returns with the twofold idea of insuring quick removal of cold air and avoiding unnecessary cost, we naturally think of "boxing" or "panning" joists wherever possible to carry the return air. Hence

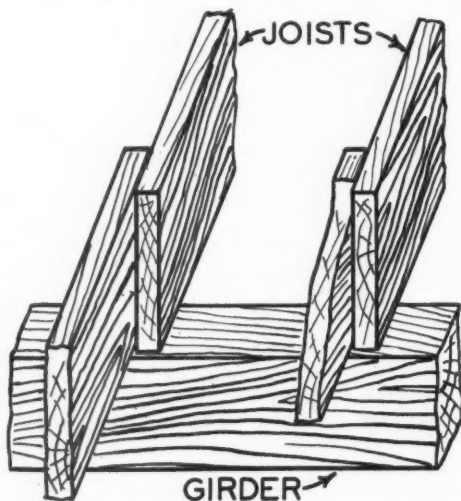


Fig. 2—Joists and girders

## Converting Old Gravity Systems To Forced Warm Air

Rearranging the return air system is particularly important when switching from gravity to blower circulation because the volume of air circulated will be from 50% to 100% greater than previously circulated by gravity. This speeding up of air circulation means a corresponding increase of relatively cool (65° to 68°) air flowing across the floor to the return air faces and annoying floor drafts may be created unless additional openings are provided through which the cool, return air may be freely withdrawn from the rooms.

By G. A. Voorhees

in sending anyone out to get the measurements of a house for which a conversion job is to be figured, caution him explicitly to show on his diagram of the floor plan, the dimensions of the joists and the directions that they run.

A house such as we are now considering, would probably have joists running crosswise and supported

TABLE I

RETURN AIR DUCT AREA Sq. Inches equals cubic content of room (Cu. Ft.) multiplied by factor listed below

Exposed Walls	GLASS SURFACE		
	Normal	Large	Extra large
1	0.024	0.03	
2	0.036	0.042	0.048
3	0.048	0.054	0.06

For use only in sizing return air ducts of converted gravity plants when warm air leaders are of ample size for forced air heating.

by a center girder running the long way of the house. We'll assume that this is the case and that there is no local building code which prohibits the use of joist spaces to convey return air. We'll assume also that the joists are lapped on top of the girder as shown in Fig. 2. (In the next installment we'll consider the



# AIR CONDITIONING SECTION

complications of some types of braced framing where the weight of the joists is carried by ledger strips spiked to the sides of the girder and where there is little or no space between the top of the girder and the floor.)

With new return air faces being installed in the various rooms, should they be placed at outside or inside walls? It's very doubtful if any fixed rule can be laid down which will be satisfactory. Some successful forced air heating men insist that return air grilles must always be placed in the remote and "coldest" part of the room while other equally successful contractors argue in favor of locations along the inside walls.

Without taking space to argue pro and con regarding relative merits of outside-wall and inside-wall locations, we'll fall back on the data published by the University of Illinois showing that, for gravity circulation in the Research Residence, air temperatures at the floor were slightly higher for the outside-wall locations of return air faces and we'll accept that as justifying the placing of the new return grilles along outside walls.

The last preceding article gave a series of factors by which the cubic content of a room could be multiplied to determine the number of square inches of return air duct area to be provided for that room in converting the plant from gravity to mechanical circulation. For your notebook, those factors are given again in Table 1. It must be understood that they are not intended for sizing warm air supply ducts; that they are merely for convenience in sizing returns on conversion jobs *when it is definitely known that the furnace and the warm air ducts are of ample size for forced air heating.*

Table II (page 64) lists rooms with return air duct and grille areas determined by means of the factors in Table I. Comparing the plan (Fig. 1) and Table I, the various columns of Table II are self-explanatory except Room 2 which includes first and second floor hall and three second floor rooms not shown on the plan, having a total content of 5700 cubic feet.

On account of the chronic complaint of a "cold draft down the open stairway" in so many houses heated by gravity, it is well to provide a generous return air duct and face area near the foot of the stairs to draw this air off the floor before it has a chance to spread out through the first floor rooms: for that reason the factor 0.06 is arbitrarily used (and is recommended) for return air ducts connected to cold air faces at the foot of an open stairway when no return air ducts are run directly from second floor rooms.

Aside from Room 2 just explained, the factor listed in Column V for each room is taken from Table I. Column VI gives, for each room, the product of the cubic content listed in Column II multiplied by the factor in Column V. Column VII is 1.3 times the area listed in Column VI.

Starting with rooms 5 and 7, Table II shows:

Room	Return duct area Square Inches	Free area of face Square Inches
5	59	77
7	52	68

If the joists are 16 inches on centers, one joist space provides ample return duct area for each of these rooms and the joists may be panned across to bring the re-

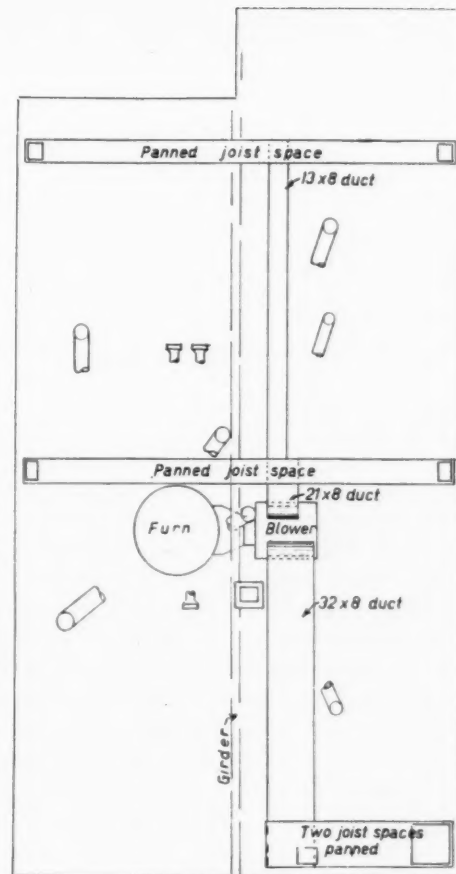


Fig. 3-B—The addition of a blower permits drawing return air from six rooms, yet less usable basement space is required than for the original 26-inch return air pipe. (See Fig. 3-A)

turn air from each of these rooms to the return air trunk line (Fig. 3-B).

Following the percentage reduction method of sizing trunk ducts as recommended in the Mechanical Warm Air Heating Code, Third Edition, the cross sectional area of the galvanized iron duct carrying the return air from rooms 5 and 7 will be:—

$$0.9 \times (59 + 52) = 100 \text{ square inches.}$$

If the return air trunk is to be a rectangular duct to save head room in the basement, a duct 13 inches wide by 8 inches deep will provide the required 100 square inches of area.

Perhaps it will be argued that room 5 is evidently a kitchen and that therefore we should not take a return air from this room as it will distribute cooking odors throughout the house. But if we're to deliver warm air TO the kitchen, an equivalent volume of return air or cold air or room air or whatever you please to call it, *MUST* get OUT somehow to make room for the incoming air.

Unless a vent flue or ventilating fan is used to positively remove kitchen air from the house, you may as well install a return grille in the kitchen—but use a register instead of a register face. Then tell your customer that when they're preparing corned beef and cabbage or cooking anything else which has a pronounced odor, they may close the valves tightly in the return air register and open one of the kitchen windows just enough to provide an outlet for room air. As the blower pressure drives warm air into the room, room air (and cooking odors) will be forced out the window.

(Continued on page 63)

# A Rational Heat Gain Method for the Determination of Air Conditioning Cooling Loads<sup>†</sup> [Part 1]

By F. H. Faust,\* L. Levine\* and F. O. Urban,\* Schenectady, N. Y.

## Introduction

SCIENTIFIC application of air conditioning equipment requires that such equipment shall have adequate capacity to maintain specific indoor conditions, but that the margin of capacity over what is required shall not be so great as to make the installation economically unjustifiable. Thus, the first step in an application is to determine the maximum cooling effect which is necessary, and the second step is to select equipment which is capable of producing this required cooling effect both economically and with a degree of flexibility necessary to meet varying conditions of operation.

This paper summarizes the factors which affect the cooling load, and describes a systematic and rational method for accurately determining its character and magnitude. A heat gain calculation sheet is presented which suitably organizes and tabulates the work in a minimum of space.

The heat gain method to be described presents certain features of advantage to the user, namely;

1. It is applicable to any kind of an enclosure, ranging from a single room to a complete building.
2. It saves time required for making the calculations.
3. It minimizes the chances of error by systematizing the work and providing a suitable calculation form.
4. It permits the engineer to select equipment of adequate capacity, without unnecessary margins, by tabulating accurately each component of the cooling load.
5. It permits the engineer to select the type of control necessary for providing flexibility to meet all conditions of operation by indicating the load components and the manner in which they vary.

The manner in which this method provides the benefits summarized will become apparent in the course of the description.

## Components of Heat Gain

The cooling load is composed of five different components:

1. Heat conducted through walls, windows, etc.
2. Heat absorbed from radiations of the sun.
3. Heat generated by lights and appliances, and other miscellaneous sources.
4. Heat brought in by outdoor air.
5. Heat liberated by people.

The components of heat gain, classified by source, may be further classified as sensible and latent heat gain. The first two components fall into the classification of sensible heat gain; that is, they tend to raise the temperature of the air within the structure. The last three components also produce sensible heat gain, but in addition they may produce latent heat gain; that is, they may tend to increase the moisture content of the air within the structure. Each component is discussed briefly below.

Heat is conducted through walls and partitions because the temperature of the air within the air conditioned space is lower than that on the opposite side of the wall. This is the same process as that by which heat is lost through walls in winter.

Heat absorbed from radiations of the sun increases the cooling load in two ways. In the first place, the sun transmits invisible, but intense, heat rays which increase the temperature of all surfaces exposed to them. With this higher temperature, more heat is conducted to the interior of the structure than if the walls were not exposed to the sunshine. In the second place, the heat rays of the sun pass almost undiminished through ordinary window glass which is exposed to them.

Temperatures of flat roofs have been observed to rise as high as 180 F. on a bright summer day, 75 to 80 deg. above the temperature of the air. The heat conduction into top floor rooms may be more than doubled because of this effect. Similarly, glass windows exposed to the sun may allow as much as 90 per cent of the incident heat to pass through, and it is not uncommon for this portion of the cooling load to be more than the total conduction through the wall proper.

Heat is generated by energy consuming appliances within the air conditioned space, such as electric lights, motors, coffee urns, steam tables, etc. Some of the appliances, such as electric lights and motors, produce only sensible heat gain. Other appliances, such as coffee urns, produce both sensible and latent heat gains. Latent heat gains may arise from the evaporation of moisture within the appliance, or from the liberation of moisture as a product of combustion where a gas flame is present.

Heat gain results from the incoming outdoor air, which may be introduced by natural, uncontrolled infiltration or by controlled ventilation. This is both sensible and latent in character, as outdoor air entering the structure may have to be both cooled and dehumidified.

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†Presented at the Semi-Annual Meeting of the AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, Toronto, Ont., Can., June, 1935. Published in Heating, Piping and Air Conditioning.

Heat is liberated by people through convection and radiation from the surface of the body, and the evaporation of moisture from the skin. The former adds to the sensible cooling load, and the latter to the latent cooling load. Where a number of people are in a relatively small space, the heat they contribute becomes an important item. The rate at which heat is contributed by a normal person not engaged in undue activity may be compared to the absorption of an average domestic refrigerator, or to that required to completely boil away a pint of water in 3 hours.

#### Relation Between Total Heat Gains and Components

A complete heat gain calculation to determine the maximum requirements for cooling involves not only the independent calculation of each of the various components, but it involves also the proper combination of these components to determine the correct maximum heat gain. Each individual component varies in magnitude from hour to hour during the day and reaches a maximum or peak value at some particular time. However, the individual maximums do not necessarily occur simultaneously, or that the maximum total heat gain actually may be less than the sum of the maximum values of the several components. For example, refer to Fig. 1, which shows a family of curves worked up in the calculation of heat gain for a group of offices.

Curves 1 and 2 show the heat conducted through walls, and the sensible heat of ventilation air, respectively. The variations in these components result from changes in the temperature of the outdoor air.

Curve 3 shows the variation in additional conduction through walls exposed to the sun. The intensity of the

solar heat striking a wall depends on the angle between the wall and the rays of the sun. This intensity is greater when the rays of the sun are most nearly perpendicular to the wall, and hence the progression of the sun from the east to west causes a variation in this component of the heat gain. Similarly, curve 4 shows the variation in heat gain from solar heat passing directly through windows.

Curve 5 shows the load imposed by the latent heat gain of ventilation air, with the heat from occupants superposed during the period of day when such occupants are present. The reason why the latent heat of ventilation air shows no variation will be discussed later.

Curve 6 shows the total heat gain, which is obtained by adding each of the components in the proper phase relation. An analysis of Fig. 1 shows that whereas individual components attain maximum values at 8 a. m., 10 a. m., 2 p. m., 3 p. m., and 4 p. m., respectively, the total heat gain is a maximum at 4 p. m. Clearly it would not be accurate (though it would be conservative) to find the greatest value that each component attains during the day, and then to add all the maximum values together to find the maximum total gain. The difference between the results obtained by adding the maximum values of the individual components, and combining these components at the time of day when the total is maximum, may be as much as 20 per cent, or as little as 5 per cent. The method of calculation described here is sufficiently flexible to permit taking account of the fact that when one component is at its peak, others may have either passed or not yet reached their peak values. The introduction of this element of additional accuracy and flexibility requires that the calculations be made for a predetermined time of day in each case. The method of predicting the correct time of day will be described later.

#### Design Conditions

The following design conditions used in making a heat gain calculation affect the magnitude of the cooling load:

1. Outdoor air
  - (a) Dry-bulb temperature
  - (b) Vapor density
2. Indoor air
  - (a) Dry-bulb temperature
  - (b) Vapor density
3. Weight of outdoor air entering the enclosure.

The conditions of the indoor air are fixed by the dry-bulb and wet-bulb temperatures which are specified according to the requirements of the application.

The amount of ventilation air is specified according to the requirements of the application if ventilation is controlled. Otherwise it is determined by the infiltration rate.

Design outdoor conditions are based on the Weather Bureau records of the locality under consideration. The design outdoor dry-bulb temperature is usually specified as a maximum value. This design temperature for comfort applications may be selected so that it will be exceeded by not more than about 90 per cent of the daily maximum outdoor temperatures during the cool-

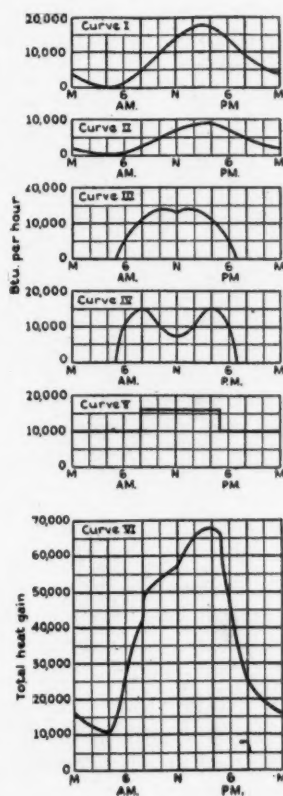


Fig. 1—Time variations of components and total of cooling load in a suite of offices

Curve I—Conduction from outdoor-indoor temperature difference

Curve II—Sensible heat from ventilation air

Curve III—Additional conduction from sun effect

Curve IV—Sun effect through windows

Curve V—Latent heat of ventilation air and heat from people

Curve VI—Total heat gain



ing seasons over a period of several years. Systems designed on the basis of such an outdoor temperature will, on occasional extreme days, be incapable of maintaining normal indoor conditions, but will be generally satisfactory, considering both performance and investments. There are several references<sup>1, 2</sup> on the subject of design outdoor conditions, and recommended values are given in Chapter 8 of THE A.S.H.V.E. GUIDE<sup>3</sup>.

The design outdoor temperature described is really the design maximum outdoor temperature. As has already been described, the maximum total heat gain may occur at some time of day when the outdoor temperature is considerably lower than its maximum value. A night club is an outstanding example of an application in which this condition arises. Hence, it is necessary to know not only the design maximum outdoor temperature, but also how the outdoor temperature varies from hour to hour, and how far it may have dropped by evening following a *maximum* day. A careful study of Weather Bureau data indicates that for practical pur-

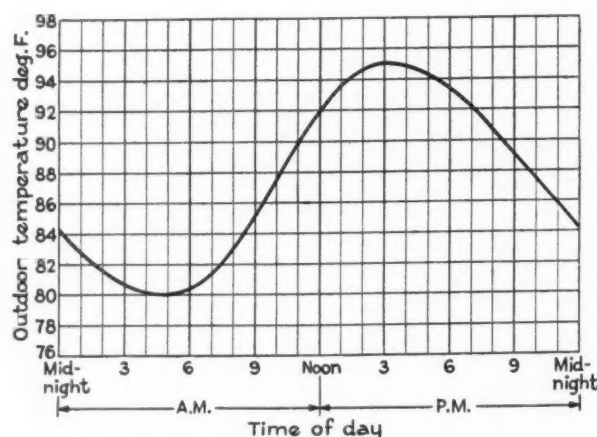


Fig. 2—Typical variation of outdoor temperature

poses the outdoor temperature may be assumed to vary in the manner shown by Fig 2. It has been found that on the average the outdoor temperature is highest about 3 p. m., and lowest about 5 a. m. The difference between the maximum and minimum outdoor temperatures on a *maximum* day may be taken as the mean difference between the daily maximum and daily minimum outdoor temperatures for the month of July. This mean difference is termed by the Weather Bureau the *mean daily range* for July. It varies from about 10 F. in some parts of the United States to about 40 F. in other localities. A table of outdoor temperatures for various hours of the day may then be constructed by using the formula:

$$t_o = t_d - BV \quad (1)$$

where

$t_o$  = design outdoor temperature at a particular time of day.

$t_d$  = design maximum outdoor temperature.

$V$  = mean daily range for July.

$B$  = an hourly factor, determined by the shape of the curve in Fig. 2, and tabulated in Table 1.

<sup>1</sup>The Relation of Climate to Air Conditioning Design, by O. W. Armspach, *Heating and Ventilating*, Vol. 29, Dec. 1932, p. 26.

<sup>2</sup>Climate in Air Conditioning, by H. W. Skinner, *Heating and Ventilating*, Vol. 29, Dec. 1932, p. 23.

<sup>3</sup>AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS GUIDE, 1935.

Table 1—Design Outdoor Temperatures for Various Hours of the Day

(t <sub>d</sub> = 95 F; V = 15 F)			
HOURLY FACTOR B	BV	DESIGN OUTDOOR TEMPERATURE (t <sub>o</sub> = t <sub>d</sub> - BV)	TIME OF DAY
0.8	12.0	83	1 a.m.
0.9	13.5	82	2
0.95	14.2	81	3
1.0	15.0	80	4
1.0	15.0	80	5
1.0	15.0	80	6
0.9	14.2	81	7
0.8	12.0	83	8
0.65	9.8	85	9
0.5	7.5	88	10
0.3	4.5	91	11
0.2	3.0	92	Noon
0.1	1.5	94	1 p.m.
0	0	95	2
0	0	95	3
0	0	95	4
0.05	0.75	94	5
0.1	1.5	94	6
0.2	3.0	92	7
0.3	4.5	91	8
0.4	6.0	89	9
0.5	7.5	88	10
0.6	9.0	86	11
0.7	10.5	85	Midnight

Table 1 shows design outdoor temperatures, calculated as outlined above, for various hours of the day in a locality where the design maximum outdoor temperature is 95 F. and the mean daily range for July is 15 F. Of course there are occasional days when the temperature range is less than the mean value, and the temperature is somewhat higher in the evening than is indicated by the above analysis. This possibility should be kept in mind.

It was implied previously that the latent heat gain of ventilation air is substantially constant for various hours of the day. A study of Weather Bureau Data shows that in general the outdoor relative humidity is lowest when the outdoor dry-bulb temperature is highest, and vice versa. Furthermore, this variation in outdoor relative humidity is of such a nature that the vapor density, or moisture content, of outdoor air is approximately constant. Consequently, the outdoor vapor density may be determined from the psychrometric chart once the design maximum outdoor dry-bulb and wet-bulb temperatures are known. The design outdoor wet-bulb temperature may be selected on the same basis as the design outdoor dry-bulb temperature; that is, high enough so that it will include about 90 per cent of the daily maximum wet-bulb temperatures during the cooling season.

The outdoor vapor density is not exactly constant during the entire day, and of course shows sharp variations during stormy periods. The assumption of a constant design outdoor vapor density on a *maximum* day, however, is reasonably accurate for comfort applications. It must be recognized that all assumptions in regard to climatic conditions are of necessity approximate.

#### Time Lag Resulting from Heat Storage

The heat storage capacity of walls results in a phenomenon akin to a time lag in the flow of heat through them. The result is that the maximum effects of outdoor temperature and solar radiation may not manifest themselves on the interior until some time after the actual maximum outdoor conditions have passed. This introduces the problem of determining time lag, which will be discussed later.

# AMERICAN ARTISAN

## AIR CONDITIONING SECTION

### Summary of Analysis

The preceding paragraphs have discussed briefly the five components of the heat gain which were summarized in the beginning, and further classified them as sensible and latent. These components have been shown to vary during the day in a manner dependent on climatic and indoor conditions. This causes a phase relation between them of such a nature that the correct maximum heat gain is not necessarily the sum of the maximum values of the components, but is the sum taken at the particular time of day when the total is a peak. This is further affected by time lag in walls.

Design conditions which affect the character and magnitude of the heat gain have been listed, and a method suggested for determining design outdoor conditions. The determination of design indoor conditions has been omitted because they are usually specified by the requirements of the application, and depend on a number of factors which are often beyond the control of one who is making the heat gain calculation.

The following sections of this paper will be devoted to methods of determining accurately the character and magnitude of the components of the heat gain, and of combining them properly to predict the total cooling load.

Name \_\_\_\_\_ Room used for \_\_\_\_\_ Job No. \_\_\_\_\_  
 Street \_\_\_\_\_ Room No. \_\_\_\_\_ Floor \_\_\_\_\_ Sheet No. \_\_\_\_\_  
 City \_\_\_\_\_ Calculated by \_\_\_\_\_ Date \_\_\_\_\_

#### DESIGN CONDITIONS

Outdoor: D.B. Temp. \_\_\_\_\_ °F. W.B. Temp. \_\_\_\_\_ °F. Abs. Hum. \_\_\_\_\_ Gr. per lb. Calculations are for \_\_\_\_\_ a.m.  
 Indoor: D.B. Temp. \_\_\_\_\_ °F. W.B. Temp. \_\_\_\_\_ °F. Abs. Hum. \_\_\_\_\_ Gr. per lb. Volume of room \_\_\_\_\_ cu. ft.  
 Temp. Diff. \_\_\_\_\_ °F. Hum. Diff. \_\_\_\_\_ Gr. per lb. Infiltration rate \_\_\_\_\_ cfm.  
 Ventilation Air, Required Amount \_\_\_\_\_ cfm. (at indoor design conditions).

#### SENSIBLE HEAT GAIN

Columns	I	II	III	IV	V	VI	VII	VIII	IX	REMARKS
	Side Wall or Partition Dimensions	Gross Wall Area, Sq. Ft.	Design D.B. Temp. Diff. °F.	Conduction from Temp. Diff. Btu. per hr. III X IV X V	Calculation of R <sub>w</sub> for VIII R <sub>w</sub> = F X A X I	F	A	I	R <sub>w</sub>	
SIDE	Windows and Doors, Number and Dimensions	Total Glass Area, Sq. Ft.	U <sub>w</sub>	U <sub>w</sub>						
1st										
2nd										
3rd										
4th										
5th										
Ceiling										
Floor										

Conduction: Time Corr. Factor, T, ( ) X Sum of Col. VI \_\_\_\_\_ Btu. per hr.  
 Vent. air: Time Corr. Factor, T, ( ) X Temp. diff. ( ) X Cfm. ( ) X 1.04 \_\_\_\_\_  
 Sun effect: Sum of Col. IX \_\_\_\_\_  
 People: No. of persons in room ( ) X Btu. per hr. per person ( ) \_\_\_\_\_  
 Electrical appliances: Watts ( ) X 3.4 \_\_\_\_\_  
 Other sources: Btu. per hr. \_\_\_\_\_

TOTAL SENSIBLE HEAT GAIN (Without window shading) \_\_\_\_\_ Btu. per hr.  
 Savings from awnings or shades: Total glass sun effect ( ) X shading factor ( ) \_\_\_\_\_  
 TOTAL SENSIBLE HEAT GAIN (With window shading) \_\_\_\_\_ Btu. per hr.

VENTILATION AIR: Cfm. ( ) X Hum. diff. ( ) X 0.68 \_\_\_\_\_ Btu. per hr.  
 People: No. of persons in room ( ) X Btu. per hr. per person ( ) \_\_\_\_\_  
 Other sources: Lb. of water per hr. ( ) X 1000 \_\_\_\_\_

TOTAL LATENT HEAT GAIN \_\_\_\_\_ Btu. per hr.  
 TOTAL SENSIBLE HEAT GAIN \_\_\_\_\_ Btu. per hr.  
 TOTAL HEAT GAIN \_\_\_\_\_ Btu. per hr.

#### EXPLANATIONS

U—Transmission Coefficient.  
 R—Solar Radiation Coefficient.  
 I—Intensity of Sun.  
 A—Absorption Coefficient.  
 F—Radiation Factor.  
 w (subscript)—Wall.  
 g (subscript)—Glass.  
 See Engineering Data Book for coefficients and factors.  
 Heat from People, Btu. per hr. per person:  
 Average conditions (at rest, sitting, office work, etc.)  
 Sensible..... 230  
 Latent..... 180  
 Medium rate of exertion (restaurant waiters, average dancing, etc.)  
 Sensible..... 230  
 Latent..... 420

Fig. 3—Heat gain calculation sheet

### Heat Gain Calculation Sheet

A calculation sheet for organizing and tabulating the calculations described in the following paragraphs is shown in Fig. 3.

Table 2—Transmission Coefficients, Temperature Differences and Solar Radiation Coefficients for Ceilings

LOCATION OF ROOM	U <sub>w</sub>	TEMP. DIFF.	R <sub>w</sub>
Not on top floor.....	U <sub>w</sub> = U <sub>c</sub>	(t <sub>o</sub> - t <sub>i</sub> ) - (3 to 5 Deg)	R <sub>w</sub> = 0
Under unventilated attic with sloping roofs (ordinary house construction).....	U <sub>w</sub> = $\frac{U_c}{1 + 0.7 \frac{U_c}{U_r}}$	(t <sub>o</sub> - t <sub>i</sub> )	R <sub>w</sub> = F a I
Under unventilated attic with flat roof.....	U <sub>w</sub> = $\frac{U_c}{1 + \frac{U_c}{U_r}}$	(t <sub>o</sub> - t <sub>i</sub> )	R <sub>w</sub> = F a I
Under well ventilated attic (natural ventilation).....	U <sub>w</sub> = U <sub>c</sub>	(Attic Temp. - t <sub>i</sub> )	R <sub>w</sub> = 0
Under fan ventilated attic.....	U <sub>w</sub> = U <sub>c</sub>	(t <sub>o</sub> - t <sub>i</sub> ) + (5 to 10 Deg)	R <sub>w</sub> = 0
Directly under flat roof (roof also forms the ceiling).....	U <sub>w</sub> = U <sub>r</sub>	(t <sub>o</sub> - t <sub>i</sub> )	R <sub>w</sub> = F a I
Directly under sloping roof (roof also forms the ceiling).....	U <sub>w</sub> = $\frac{\text{Roof area}}{\text{Horizontal Ceiling Area}} U_r$	(t <sub>o</sub> - t <sub>i</sub> )	R <sub>w</sub> = F a I

#### Notes:

1. t<sub>o</sub> = Design outdoor dry-bulb temperature.
2. t<sub>i</sub> = Design indoor dry-bulb temperature.
3. U<sub>w</sub> = Overall transmission coefficient.
4. U<sub>c</sub> = Transmission coefficient for ceiling alone
5. U<sub>r</sub> = Transmission coefficient for roof alone.

### Conduction From Temperature Differences

The technique of calculating heat conduction through a wall is well known and widely used in determining heating requirements for winter. The heat gain by conduction is calculated from the formula:

$$H_c = A_w U_w (t_o - t_i) \quad (2)$$

where

H<sub>c</sub> = heat conducted through the wall, window or other partition, Btu per hour.

A<sub>w</sub> = Area of wall, window, etc., sq. ft.

t<sub>i</sub> = design indoor temperature, F

t<sub>o</sub> = design outdoor temperature, F

U<sub>w</sub> = overall coefficient of heat transmission of the wall, window, etc., Btu per hour per sq. ft. per F.

A complete discussion of the transmission of heat through walls, etc., is given in THE A.S.H.V.E. GUIDE<sup>3</sup>, Chapter 5, (Continued on page 72)

6. F = Radiation factor. Determine F to use in fourth column from Fig. 5 by using the value of U<sub>w</sub> calculated in the second column.
7. a = Absorption coefficient. (See table 4.)
8. I = Intensity of sun. Determine I to use in fourth column from Table 3, using values for horizontal surfaces.

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## *The only Complete* AUTOMATIC HEAT AIR • CONDITIONING

**Scientifically designed and  
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If you haven't seen the new Herman Nelson Automatic Heat and Air-Conditioning Equipment—if you haven't heard the Herman Nelson advertising, sales and merchandising story—be smart and send us a note on your letterhead so that our representative can arrange to call without delay.

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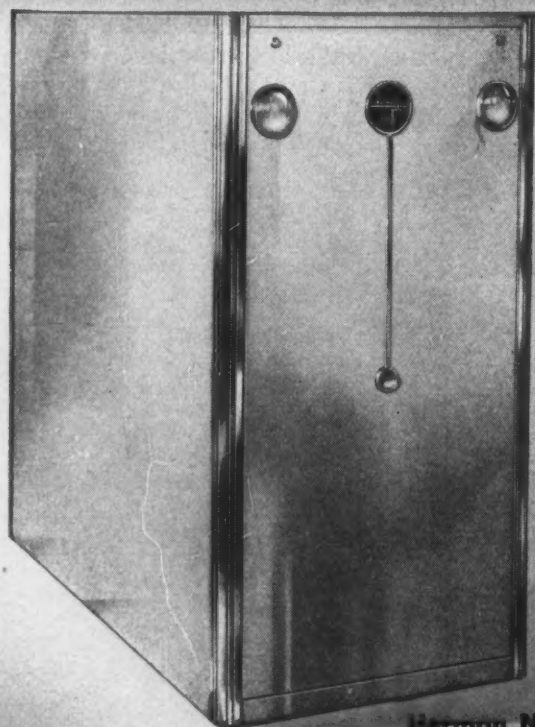
they're making the hot spots first. Get yourself on the list for an early call.

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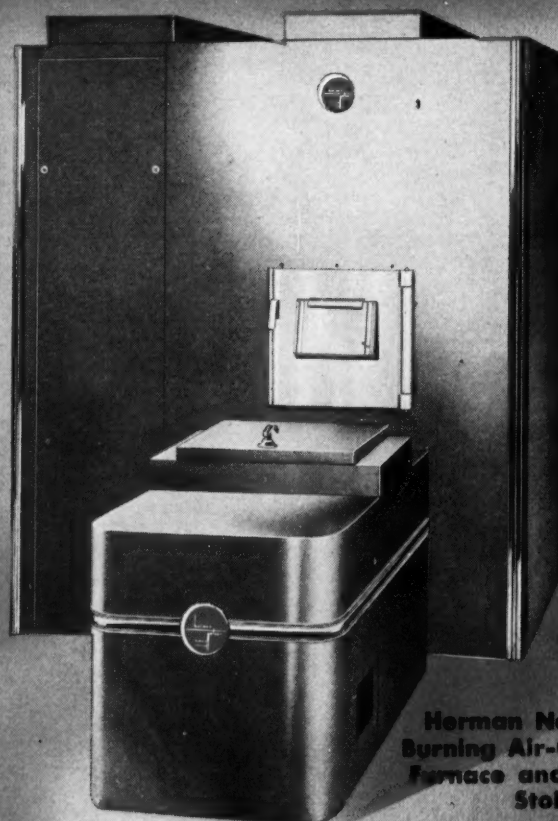
If you are among those dealers who are determined to go places in the Automatic Heat and Air Conditioning Business, write or wire us today and we'll have a representative at your door as fast as he can get there.

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Oil Burning Boiler**



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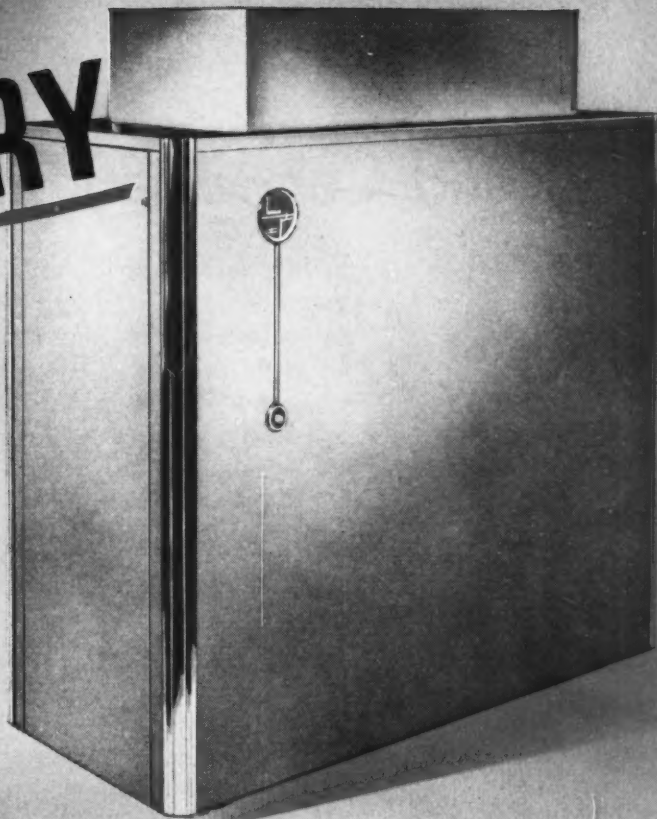
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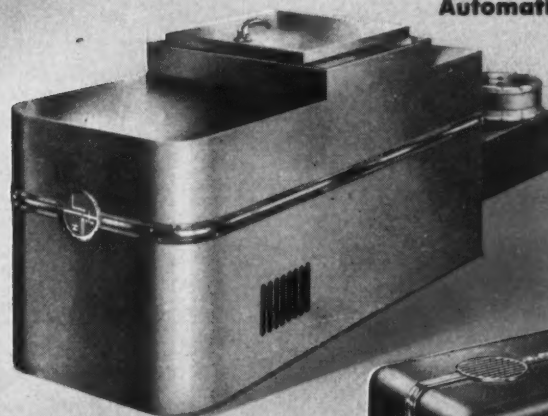
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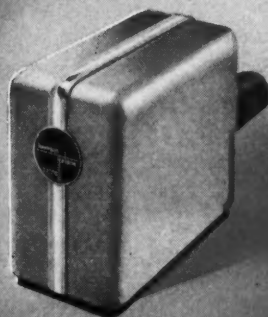
Herman Nelson  
Oil Burning  
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Conversion Oil Burner



Herman Nelson  
Self Contained Summer  
Air Conditioner



# HERMAN NELSON

*Automatic Heat and Air Conditioning*



# Frost and Condensation on Windows [Part 3]

With relative humidities of a higher percentage being recommended by physicians and guaranteed by installers, frost and condensation has become an acute problem. This series of articles explains why condensation appears and suggests some methods for lessening and preventing its accumulation.

By L. W. Leonhard<sup>1</sup>  
and J. A. Grant<sup>2</sup>

## Operational Means of Preventing Condensation

Condensation to an objectionable degree may be considered as an emergency situation, since it is not one that must be contended with continually during the heating season, but occurs only in rather extreme weather conditions. Therefore, if this emergency condition can be dealt with by a reduction of the moisture content of the air, the benefits of high humidity can be dispensed with temporarily for the advantages to be gained. If some dehumidifying device could be produced, it would answer the purpose in those emergency situations. However, the same result can be attained by more simple and obvious means.

The rate at which moisture is generated should be reduced by cutting off all moisture sources where possible. Then the moisture content can be reduced by natural means as exchanging the moisture-laden air within for the relatively dry, outside air. This may be done by providing cracks at the movable windows by slight openings, whereby infiltration is encouraged, or it can be done more quickly and positively by opening doors or windows about the house for a few minutes, thus effecting a rapid exchange of inside and outside air.

## Effect of Tight House

If a quantity of contained air at, say, 70 deg., could be locked up in an occupied house, so that there was no exchange of air between inside and outside, the relative humidity of the contained air would approach the saturation condition of 100 per cent humidity because of the contribution of steam or vapor from various sources, such as steam from cooking and laundry processes and the exhalation from lungs and skin of the occupants. Also, in many cases, means of increasing the humidity are employed, such as the water pan of the warm air furnace, and various forms of humidifiers to be hung on or about steam radiators. At 100 per cent humidity, the dew-point temperature is coincident with the temperature of the air, or 70 deg. in the case suggested above, and moisture would probably form on the inside of all exposed surfaces, including both walls and windows, if the outside temperature was lower than 70 deg.

However, no house is proof against leakage, and as a result, there is bound to be a constant exchange of air between inside and outside. Suppose the outside temperature is 10 deg. and its relative humidity 80 per cent. Each cubic foot of outside air contains a very much smaller amount of moisture than does each cubic foot of inside air. Consequently, every exchange results in carrying some moisture out of the house, thus maintaining a condition of air inside at a very much lower relative humidity than 100 per cent. The actual humidity maintained will represent an equilibrium between the rate at which moisture is contributed to the inside air from the various sources, on the one hand, and the rate at which exchange takes place between the inside and outside air, on the other.

As an example, suppose the air in the room is at 70 deg. and 40 per cent relative humidity, while the outside air is at 10 deg. and 80 per cent relative humidity.

The weight of moisture per cubic foot of inside air is 0.000461 lb. and the dew point is 44 deg. If there is considerable wind, the inside temperature of the glass of the windows is found to be about 25 deg. The glass surface, is therefore, 19 deg. below the dew point, and there will be heavy and rapid deposition of moisture, which will immediately be frozen into ice, since the surface temperature is below 32 deg.

Now, let doors and windows be opened for a few minutes, and assume that three-fourths of the air inside the room or house has been replaced by outside air. This does not mean that the temperature of the freshly introduced air in the room will be as low as three-fourths the distance between 70 deg. and 10 deg., because the great mass of walls and furniture will immediately heat the relatively slight mass of air, so that perhaps the lowest temperature registered by a thermometer might not be below 50 deg.

The weight of moisture in each cubic foot of the newly introduced air will be 0.000088 lb., and the weight of the moisture in a cubic foot of the mixture of the old air and the new in the room, in the proportions of one to three as assumed, will be 0.000181; the humidity will be about 16 per cent and the dew-point temperature 20 deg. which is now below the inside surface temperature of the glass. The result is that the ice will immediately begin to evaporate from the glass. The acquisition of moisture by the aid of evaporation from the glass and other sources will soon raise the dew-point temperature, and evaporation from the windows

(Continued on page 54)

1. Research Engineer, Detroit Steel Products Co., Detroit, Michigan.

2. Professor of Mechanical Engineering, University of Michigan.

3. Chief Engineer, Detroit Steel Products Company, Detroit, Michigan.

# OIL ECONOMY—

## A New Cast Iron Furnace For Oil Burning Exclusively

Resulting from close cooperation with oil burner manufacturers, *Oil-Economy* is a revolutionary development in Air Conditioning and Gravity Warm Air Heating. It is not an old type furnace redesigned but is new from the base up. No furnace exists which is so adaptable to oil heat from all angles as *Oil-Economy*.

### Beauty of Appearance

The two-tone green enamel enclosure—made of 20 gauge automobile body steel—gives a beautiful appearance and will lend charm to any basement. The burner is completely concealed. *Oil-Economy* is also available in round galvanized casings for air conditioning and gravity.

### More Heat Per Gallon

It becomes a simple problem in arithmetic to calculate the fuel savings with *Oil-Economy*. Its construction is such that more heat can be extracted than with any design on the market. With a capacity up to 1,000 inches of heat pipe or 190,000 B.t.u., extremely low stack temperatures are had even at this high rating, while at the low rating the gas travel is so natural that all heating surface is effectively used.

### Joint Elimination

The old "bug-a-boo" of joints of cast iron furnaces is entirely overcome as there are but two. One of these is completely out of the fire zone. The other is not only sealed by iron to iron construction but is further protected by high temperature cement on both sides, thus eliminating all possibility of leakage.

### Large Oversize Radiator

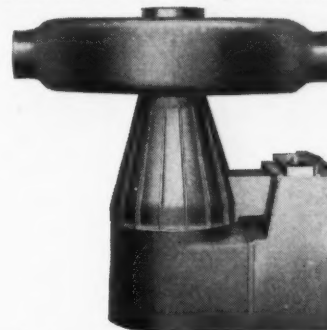
Twice the size of the ordinary type, the *Oil-Economy* radiator is of one piece construction with cleanout and exit collar cast integral and extending through the jacket or casing. The fact that there is more effective heating surface in this radiator alone than in an entire twenty-two inch furnace will give you some idea of the efficiency obtained with *Oil-Economy*.

### BY ALL MEANS—GET THE AGENCY

The *Oil-Economy* Furnace offers unusual selling advantages and the International Heater Company also offers a complete line of boilers and furnaces for all types of jobs plus direct mail and sales assistance. Write for complete information and location of nearest stock.



The burner housing provides for air circulation over the burner and has a large removable access door.



Showing burner space, combustion chamber, cone shaped expansion chamber and radiator.



The double pass radiator—nothing can approach it in heat extracting qualities.

# INTERNATIONAL

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# Oil Burning In Residences<sup>†</sup> [Part 2]

By D. W. Nelson\*

Madison, Wis.

IN the laboratory it has not been found difficult to make an installation that would result in 10 per cent CO<sub>2</sub> with clean burning on intermittent operation. It was possible to reduce the excess air on continuous operation and obtain considerably higher CO<sub>2</sub> than 10 per cent, but these same adjustments could not be maintained during intermittent operation because of the less favorable temperatures of the brick work and consequent smoking.

Previous miscellaneous tests in residence installations had indicated a wide variation in the efficiencies of combustion and heat absorption. As an example, when the oil burner was first installed in the residence on which the damper study was made, the CO<sub>2</sub> obtainable without smoking was 6.0 to 6.5 per cent. This was brought up to 8.0 to 8.5 per cent by various alterations up to the time of the damper study. By rebuilding of the combustion space, there is no reason why 10 percent should not easily be secured. Since the tests made on various residence installations had indicated wide variations in efficiency, it was considered worth while to make a survey of as many residence installations as possible in order to find the variations and the average figures for present installations.

Readings were taken on 141 residence installations.<sup>1</sup> Steam systems represented 78 of these, hot water systems 29, and warm air 34. Burners of 28 different manufacturers were represented some of whom had two

Types	Steam	Hot Water	Warm Air	Total
H. P. Atom.....	35	12	11	58
L. P. Atom.....	17	5	4	26
Hor. Rotary .....	4	3	0	7
Vert. Rotary .....	15	7	6	28
Vaporizing .....	7	2	13	22
Totals .....	78	29	34	141

types and Table 1 shows the distribution of burner types among the three kinds of heating systems. The largest number made by any one manufacturer was 21 and of any one type and manufacture was 19. The average number per manufacturer was slightly less than 5.

The main items desired were the CO<sub>2</sub> readings indicating the extent of the loss from excess air and the flue gas temperature which while dependent to some extent on the excess air is also dependent on the rate at which the oil is being burned and the ability of the heating surface to absorb that heat. These two readings give a means of finding the largest part of the losses in the form of heat passing up the chimney. It there-

fore becomes possible to determine the maximum possible efficiency of the installation.

The actual efficiency is somewhat less because of possible escape of hydrogen and hydrocarbons as fuel items to the chimney and radiation losses to the basement and floor. Heat loss to the basement is useful provided the basement is not overheated for the purpose for which it is intended, and some heat loss to an inside chimney helps to supply useful heat to the house. It is therefore quite possible that the unmeasured losses are offset by unmeasured gains and that the efficiency as determined by CO<sub>2</sub> and flue gas temperature at the boiler outlet is approximately the efficiency involved in the cost of heating.

The CO<sub>2</sub> determinations are shown in Table 2 tabulated as to systems and as to the number falling in each range of 1 per cent. The CO<sub>2</sub> was determined at the boiler outlet and in the combustion space whenever easily possible. In some installations, it was determined

%CO <sub>2</sub>	Steam		Hot Water		Warm Air		Total	
	Comb. Space	Smoke Pipe	Comb. Space	Smoke Pipe	Comb. Space	Smoke Pipe	Comb. Space	Smoke Pipe
Below 5 .....		5				1		6
5-6 .....	4	12		4	1	2	5	18
6-7 .....	6	16	4	2	3	8	13	26
7-8 .....	7	10	2	8	4	8	13	26
8-9 .....	4	12	3	8	1	7	8	27
9-10 .....	5	9	1	2	1	3	7	14
10-11 .....	11	7	1	2	2	5	14	14
11-12 .....	4	3	1	1			5	4
12-13 .....	3	5		1			3	6
Above 13 .....	3							3
Ave. ....	9.06	7.78	7.94	7.98	7.55	7.69	8.62	7.80
No. ....	47	79	12	28	12	34	71	141

in only one of the two locations and the number of readings is given directly below the average in each column.

The average CO<sub>2</sub> obtained in the combustion space was 8.6 per cent in 71 installations. The average at the smoke pipe connection was 7.8 per cent in 141 installations. The CO<sub>2</sub> content was determined in both locations in 57 cases. The average of the CO<sub>2</sub> in the combustion space was 9.1 per cent and at the smoke connection was 7.4 per cent. This difference, if real, indicates the infiltration of air between the two locations. It is, however, difficult to obtain an average sample in the combustion space since mixing or combustion may not be complete at the point of sampling. A  $\frac{5}{16}$  in. copper tube closed at the end and with small holes along the side was used for sampling.

Considering 10 per cent as a reasonable standard, 24 installations proved to be as good or better than might be expected. Six installations were operating with such a low excess of air that the CO<sub>2</sub> was 12 to 13 per cent. As great a number as were above the dividing line of 10 per cent were below 6 per cent which indicates in these cases the use of an average of about 200 per cent excess air. No attempt was made to change adjustments so that the findings represent actual residence heating conditions during average win-

\*Assistant Professor of Steam and Gas Engrg., University of Wisconsin.

<sup>1</sup>The following worked on this project under CWA: W. F. Bakke, E. P. Hansen, L. E. Heger, F. C. Rossow; and the following under FERA: R. H. Amundson, G. W. Androne, H. C. Mittelstaedt, R. H. Newbury, and R. A. Wilson. Project carried on in the Dept. of Mech. Engrg., University of Wisconsin, Prof. G. L. Larson, Chairman.

<sup>†</sup>Presented at the Semi-Annual Meeting of the AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, Toronto, Ont., Can., June 1935. Published in Heating, Piping and Air Conditioning, July, 1935.



## "Who Wants Constant 45% Humidity?"

In the first place, I have never seen a humidifier that could produce 45% humidity in mild weather; and in cold weather, 45% humidity is entirely too much.

**YOU ARE RIGHT MR. HEATING CONTRACTOR  
... HERE IS THE ANSWER IN  
AUTOMATIC JUNE**

*Get our Booklet  
on  
Humidification*  
**IT IS  
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The Humitor

It tells everything you should know about residential humidification—how to figure humidity requirements; how to use humidification to land air conditioning jobs. It is the finest, most authoritative work on this subject ever written. Illustrated with charts in colors.

It is a mistake to assume that indoor humidity should be held at any given figure. Indoor humidity should be maintained on a sliding scale to accord with outside temperatures. And this is just what Automatic June does.

It presents an evaporating surface so great that in warm weather, with accompanying low bonnet temperatures of the heating unit, sufficient moisture is evaporated to provide ample humidification; and in cold weather it controls evaporation so that excessive moisture is not condensed on windows and walls.

Automatic June is not a mere humidifier with automatic water-feed. It is a humidifying system which automatically graduates indoor humidity as weather conditions demand.

Correct humidification will bring you more profits, more new customers, and will lead you to more conditioned air heating business than you have any idea of. But you must know the facts about air humidity and its control.

*Write for your copy today.*

**THE MONMOUTH PRODUCTS CO.**  
221 E. 131st St. Cleveland, Ohio

# AUTOMATIC JUNE

*The Hydro-Metric Humidifying System*

# AIR CONDITIONING SECTION

**Table 3—Flue Gas Temperature Measurements Obtained in the Survey**

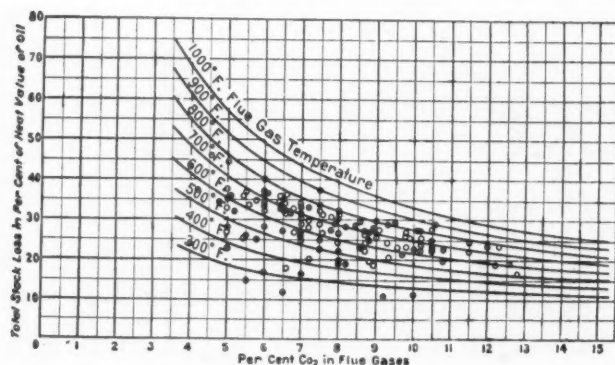
Flue Gas Temp. °F	Steam	Hot Water	Warm Air	Total
Less Than 200				
200 - 300 .....	1	1	2	4
300 - 400 .....	4	1	..	5
400 - 500 .....	7	4	2	13
500 - 600 .....	12	5	6	23
600 - 700 .....	24	9	9	42
700 - 800 .....	29	9	15	53
Above 800 .....	3	..	..	3
Ave. Temp. °F.....	642.6	612	634.8	634
Number .....	80	29	34	143

ter weather. In some cases only a change in air adjustment might improve the CO<sub>2</sub> determination, while in other cases the large amount of excess air is necessary due to faulty fuel preparation or lack of mixing of fuel and air at proper temperatures.

The flue gas temperatures found on the various systems are shown in Table 3. These temperatures were taken in the smoke pipe directly beyond the connection to boiler or furnace. The reading was taken after several minutes of burner operation and is considered to be close to the average for the usual running periods of burners. The average secured for all installations observed was 634 F. Considering 500 F. as a reasonable standard, 121 installations showed a higher outlet temperature than this standard and 22 a lower value.

The survey results as to CO<sub>2</sub> and flue gas temperatures as given in Tables 2 and 3 are shown graphically on Fig. 8. This curve sheet has been taken from a commonly quoted Government bulletin and shows total stack loss in per cent of heat value of the oil for various flue gas temperatures and CO<sub>2</sub> values. The survey data of individual determinations of CO<sub>2</sub> and flue gas temperatures have been superimposed on this as points.

The average of 7.8 per cent CO<sub>2</sub> and 634 F. indicates a stack loss of 27 per cent. The reasonable standard for an efficient installation, 10 per cent CO<sub>2</sub> and 500 F., indicates a loss of about 18.5 per cent. The probable maximum efficiency of the average installation observed would be 73 per cent. Other losses, such as unconsumed fuel items, radiation and conduction losses, would tend to make this lower and recovered heat from the smoke-pipe and chimney would tend to increase it. There is also a loss of heat during the off-periods that must be made up by longer running periods which therefore causes a reduction in efficiency in the production of useful heat to the rooms.



**Fig. 8—Results of survey as to flue gas temperature and CO<sub>2</sub> superimposed on a stack loss diagram**

The largest loss measured was with a CO<sub>2</sub> of 4.6 per cent and a flue gas temperature of 780 F. and amounted to 46 per cent. The smallest loss amounted to 11 per cent and was found at temperatures of less than 300 F. It is interesting to note that provided the outlet temperature is low the loss of efficiency due to low CO<sub>2</sub> is not serious. Sufficient heat absorption surface for the burner capacity used seems most essential.

## Burner Rate vs. Heating Surface

An intermittent oil burner operates at its maximum capacity as to running time only on the coldest days of the year, and on milder days releases heat at the same rate but for fewer total hours. In hand firing the maximum rate is only used on the coldest days, consequently a lack of heating surface is only extremely serious at those times. In oil burning, it is serious at all times as the burner is releasing heat at the maximum rate. The lack of adequate heating surface is further aggravated by the tendency to adjust the burning rate in excess of the maximum heat requirements. Some of the reasons for this are: lack of knowledge of maximum heat requirements, necessity for pick-up capacity for lowered night temperatures, fitting the burning rate and brick work to the available combustion space rather than to the heating load, and the greater ease with which complete combustion can be obtained at a high burning rate than at a low rate.

As an example of the overloading of a boiler the case of a larger installation than any included in the present survey may be cited. The boiler is an 8-section square boiler originally used with hand firing of coal. When converted to oil the entire combustion space was used for oil burning which allowed the burning of about 13 gal. per hour based on 3 cu. ft./gal. The flue gas temperature obtained on test was 920 F. after a few minutes of operation and the CO<sub>2</sub> was 8.5 per cent which indicates a 36 per cent stack loss during running periods. The boiler required an additional 5 sections to burn efficiently 7 gallon per hour which would be ample for the heat requirements. The flue gas temperature under these conditions would probably be 450 F. and the heating surface would be about 35 sq. ft. per gallon of fuel burned per hour.

## Flue Gas Temperature

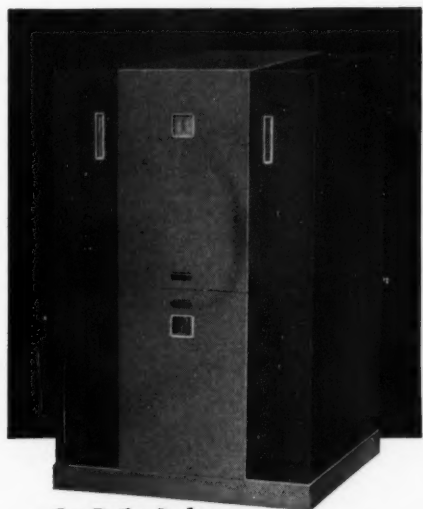
The flue gas temperatures shown in Table 3 were taken at the boiler or furnace outlet or connection to the smoke pipe. Extra heating surface commonly termed heat savers was installed in one steam system, in two hot water systems, and three warm air systems.

**Table 4—Division of Determinations of Flue Gas Temperatures and CO<sub>2</sub> as to Age of Installation**

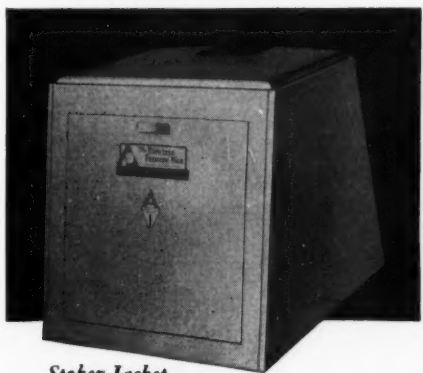
	Hot Steam	Hot Water	Warm Air	Weighted Ave.
	3 Yrs. or Less			
Flue Gas temp.....	650	620	615	635
CO <sub>2</sub> .....	7.5	7.7	7.9	7.7
No. Installations .....	45	14	24	83
	Older Than 3 Yrs.			
Flue Gas temp.....	635	600	680	633
CO <sub>2</sub> .....	8.2	8.2	7.5	8.0
No. Installations .....	32	15	9	56

(Continued on page 56)



Water  
Heater  
Cabinet

Gas Boiler Jacket



Stoker Jacket

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*with beautiful Steel Jackets  
for your heating and  
air-conditioning units!*

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Let Berger help make your old products more popular and profitable, and your new products instantly successful. Increased utility and arresting beauty can be built into jackets for boilers, oil burners, stokers, etc., through the capabilities of Berloy engineering service.

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# BERLOY

Oil Burning  
Air Conditioning Jacket

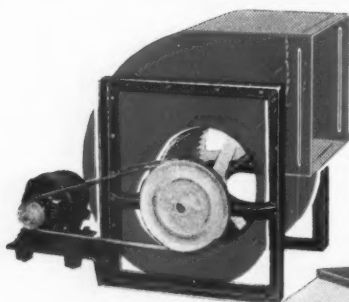
Coal Boiler Jacket

**YOU  
AND YOUR CUSTOMER  
will be better satisfied**  
**IF YOU INSTALL  
HY-DUTY  
BLOWERS**

**SUPERIOR FEATURES**

**MAKE THEM EASY TO SELL  
AND THEY STAY SOLD**

- Rugged Construction
- Heavy Gauge Steel Throughout
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- Attention Only Once a Season



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Attic Ventilator

Right: HY-DUTY  
Blower-Filter Unit

The HY-DUTY FILTER UNIT is the most advanced unit obtainable. Its highly efficient air filter is all metal, needs cleaning only once a season and never needs replacing—an exclusive HY-DUTY refinement that ends too frequent servicing of filters and buying new ones.

Just a touch of your hand changes the position of the cabinet door for either vertical or horizontal duct installation. Your customer can switch over to an outside summer connection just as easily.

ATTIC VENTILATORS AND BLOWER FILTER UNITS carried in stock in full range of sizes, capacities and discharge outlet positions. Send for engineering information and catalog.

**SCHWITZER-CUMMINS CO.**  
**BLOWER DIVISION**  
FAN STREET.... INDIANAPOLIS, U.S.A.

**Some Comparative Fuel Costs**

THE data shown in the tables following are the results of tests conducted by the James Spear Stove and Heating Co., Philadelphia, to demonstrate the relative operating costs of what is known as a split air conditioning system and a warm air, air conditioning system. Particular attention is called to the cost of furnishing hot water, a point often stressed by the boiler-burner salesman.

No. 1935 house is equipped with a central warm air conditioning system with an auxiliary oil burner. The hot water is supplied by an electric heater, the water for which is pre-heated in the winter by the oil burner installed in the warm air heater.

House No. 1933 has a split air conditioning system with a boiler burner unit which heats both the house and the domestic hot water. Contents.

No. 1935 House.....	22,473 cu. ft.
No. 1933 House.....	17,611 cu. ft.

Difference .....	4,862 cu. ft. — 21.63%
	B.T.U. Loss at

	Register
No. 1935 House.....	199,549
No. 1933 House.....	146,454

Difference .....	53,095 — 26.60%
------------------	-----------------

*Fuel Consumption  
Estimated (\*)*

No. 1935 House.....	3,550 Gal. Heating Only
No. 1933 House.....	2,472 Gal. Heating Only

Difference .....	1,078 Gal. — 43.61% More
------------------	--------------------------

*Actual*

No. 1935 House.....	2,547 Gal. Heating Only
No. 1933 House.....	3,085 Gal. Htg. & Dom.

	Hot Water
Difference .....	538 gal. — 17.43% Less

\*85% Efficiency Based on Degree Days @ 70°.

**ACTUAL COST**

No. 1935 House	
Heating Only—2,547 Gal. No. 3 oil @ \$0.0592	\$150.78
Elec. Water Heater.....	95.42

**\$246.20**

No. 1933 House	
Htg. & Dom.	
Hot Water—3,085 Gal. No. 4 Oil @ \$0.0566	\$174.61

Difference—40.99% More .....	\$ 71.59
------------------------------	----------

**Estimated Cost Using Oil Only for Fuel**

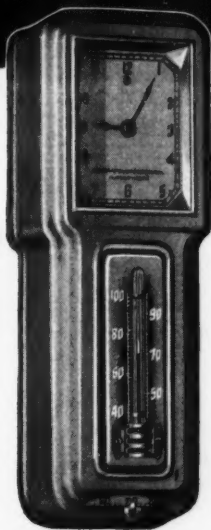
No. 1935 House	
Heating Only — 2,547 Gal. No. 3 Oil @ \$0.0592	\$150.78
Dom. Hot Wtr.— 421 Gal. No. 3 Oil @ .0592	24.92

**\$175.70**

No. 1933 House	
Htg. & Dom.	
Hot Water—3,085 Gal. No. 4 Oil @ \$0.0566	\$174.61

Difference—.62% Less .....	\$1.09
----------------------------	--------

Cost of installation for split system was \$2,500.00, while the central system was \$1,756.00.



## NATIONWIDE SERVICE

**T**O PROPERLY serve the automatic heating and air conditioning industry, Minneapolis-Honeywell maintains factory branches and distributing offices in principal cities from coast to coast. There is a Minneapolis-Honeywell control for every job and complete stocks are available at all times. Minneapolis-Honeywell engineers are at your call for consultation on any problem pertaining to the control of automatic heating or air conditioning, without cost or obligation. This

nationwide service is backed by more than half a century of research and engineering experience covering all phases of this vital and important subject. Standardize on Minneapolis-Honeywell. You'll find greater acceptance for your equipment and better service from it when you do. Minneapolis-Honeywell Regulator Company, 2726 Fourth Avenue South, Minneapolis, Minn. Branch and distributing offices in all principal cities. In Canada: Minneapolis-Honeywell Regulator Co., Ltd., 117 Peter St., Toronto. European sales and services: 233 Heerengracht, Amsterdam.

• Dependable Controls Cost Less Than Service •

# MINNEAPOLIS-HONEYWELL

Control Systems

BROWN INSTRUMENTS FOR INDICATING, RECORDING AND CONTROLLING



## The Importance of Humidity to Health

In the cold winter months moisture is frozen out of the air so our air becomes dry outside. As it is taken into our homes and heated, it immediately expands and becomes relatively drier as there is less moisture content in a given amount of air than there was before it was heated. Unless additional moisture is added to the air that is heated, the relative humidity becomes very low. The moisture carrying capacity of heated air is much greater than cold air and unless moisture is added this air becomes thirsty and seeks additional moisture. It absorbs moisture from every available source—the furniture, your body, your throat and nasal organs—wherever it finds it.

The chart shown below is interesting:

Month	Average Indoor Relative Humidity	Total Number of Cases of Respiratory Diseases Per 1000 Population
July .....	59%	Good Health { 17 20 23 29
August .....	56%	
September ..	51%	
October .....	40%	
November ...	20%	Poor Health { 40 58 92 44
December ...	12%	
January .....	12%	
February ....	14%	
March .....	18%	102 89
April .....	25%	
May .....	35%	Good Health { 35 22
June .....	57%	

This brings up the question—"what temperature is comfortable?" Two factors enter into this problem. One is the temperature of the air; the other is the relative humidity. That immediately brings into this picture of heating the air for our comfort the point of adding moisture to the air to make it comfortable. Here is a table which brings this out very clearly

If the Relative Humidity Is	Then Temperature Required for Comfort Is
80%	58°
70%	62°
60%	64°
50%	67°
40%	70°
30%	72°
20%	74°
10%	77°

Proper Humidity { } Proper Temperature

You can see by the table that with an average relative humidity of 40% a room temperature of 70 degrees gives you proper comfort in your home.

Drop down the chart a little further where you only have 10% relative humidity and you immediately have to carry 77 degrees in temperature; with 20% relative humidity you have to carry 74 degrees in temperature; at 60% relative humidity 64 degrees temperature. You can see that the higher the relative humidity (to a certain point) the more comfortable you are at lower temperatures.



### SUMMER—THERMOSTAT—WINTER

One temperature controller for two seasons—air conditioning. One turn of switch and your air conditioning system is set for the up swing of summer temperature. One turn again and it is set for the down swing of winter temperature.

May we ask—is it easier to buy and install an additional thermostat?

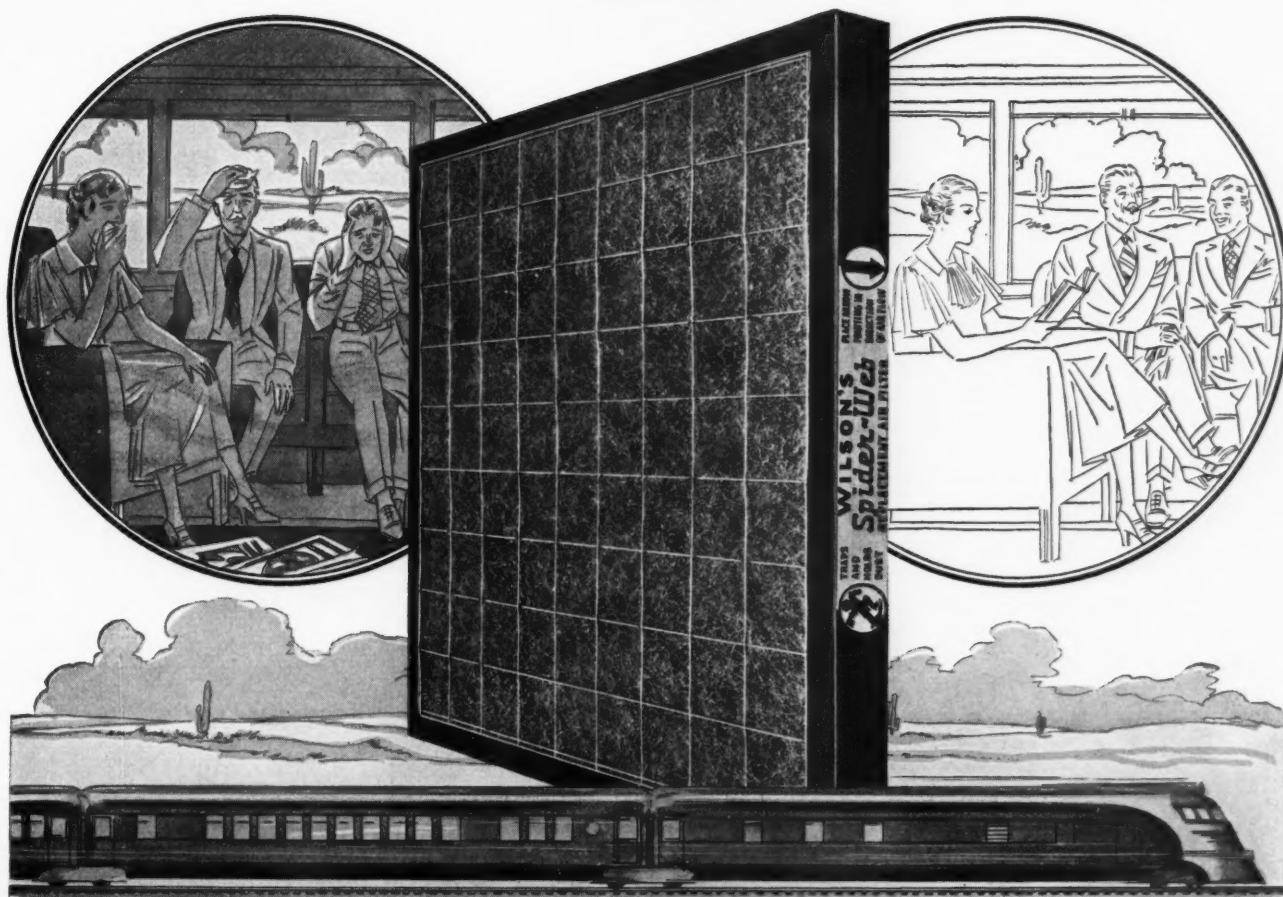
—or just turn a switch. It's the economical way. One Summer-Winter Thermostat at slight cost above the old-fashioned One-Season Thermostat. It's the modern progressive way.

**JULIEN P. FRIEZ & SONS, Inc.**

"The Makers of America's Weather Instruments"

BALTIMORE

MARYLAND



## LEADING RAILROADS INDORSE IT

Air conditioning on transcontinental trains, which must speed over mile after mile of dusty plains and sandblown desert regions, is the severest test that can be given an air filter. The fact that many railroads have turned to Wilson Spider-Web, is therefore proof of its greater efficiency and economy.

Wilson Spider-Web traps and holds more dust.

Because it gives the greatest amount of impingement surface.

Progressive construction allows easy entrance of air into first layer, gives maximum dust holding capacity in second layer.

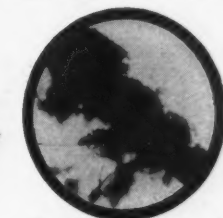
The natural springiness of Keratin (animal hair) prevents packing or settling. It leaves no spots near the container margins unguarded.

The filtration media of Spider-Web is Keratin (animal hair) thoroughly cleansed, sterilized, deodorized and treated with an adhesive oil that traps and holds the dust.

If you seek a low first cost air filter that is efficient under the most severe conditions and cleans air at lower maintenance cost, investigate Spider-Web Air Filter.

*Because of its lasting, live resiliency, the Keratin of the Spider-Web constantly presses outward against the sides of the container. It doesn't pack to increase filtration resistance, or settle to leave unfiltered air passages at margins. Greater impingement surface insures greater dust holding capacity.*

*No matter how tightly you squeeze a handful of Keratin, it rebounds instantly like a sponge when you release it.*



*Magnified view of Keratin fiber picked at random from a filter in use, shows how dust clings to adhesive surface of hair.*

**WILSON**  
**Spider-Web**  
AIR FILTER  
TRAPS AND HOLDS DUST



**WILSON & CO.** HAIR DIVISION

4100 South Ashland Ave., Chicago

## Frost and Condensation

(Continued from page 44)

will cease, and in time deposition will again take place, but, in the meantime, some of the ice coating will have been actually removed and deposition has been arrested for a period. By a few applications of this treatment, the deposition can be stopped and the ice already formed can be removed by evaporation without melting.

### House Proves Theory

This theory has been put to actual test in a residence. In one experiment, the inside temperature was 75 deg. and the relative humidity was 60 per cent. This high humidity can be attributed to the fact that the house was newly constructed and the plaster had not yet dried out. The dew-point temperature was 59 deg. The outside temperature was 40 deg. Inasmuch as there was but little wind, the inside glass temperature was about 54 deg. As a result, there was considerable condensate deposited because of the high humidity in spite of the very moderate outside temperature.

The doors and at least one window in each room were opened for about three minutes. About five minutes after these were closed again, the temperature of the room had reached 73 deg., and in ten minutes the original temperature of 75 deg. had been completely restored. The relative humidity was reduced by this airing from 60 per cent to 25 per cent, and the dew point from 59 deg. to 35 deg., which would indicate that nearly all the old air had been cleaned out and replaced

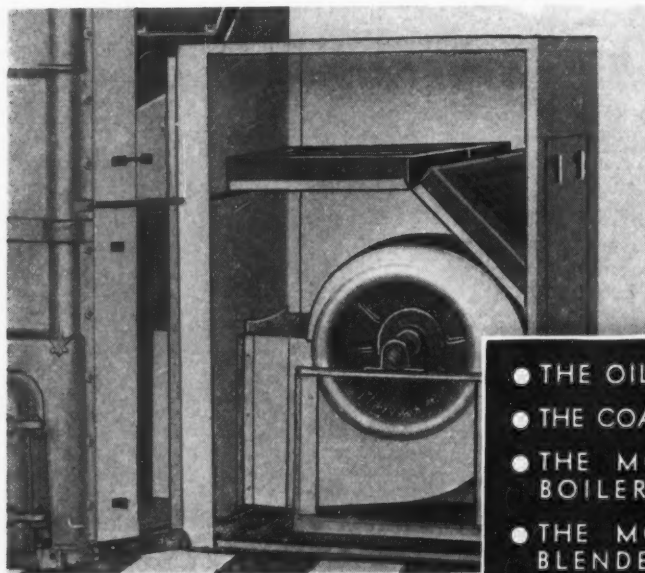
by new in the three-minute airing. Under the newly established conditions, the dew-point temperature was 35 deg. and the glass temperature 54 deg., so that condensation was no longer forming on the windows, but instead the moisture previously deposited was actually evaporating. One hour after the airing, the moisture had all disappeared from the windows. However, after an interval of three hours, light condensation began to appear again because of the moisture taken up by the air from the plaster and from the evaporation of that from the windows as well, necessitated another airing.

On another occasion, the outside air temperature was 5 deg. and a strong wind was blowing. During the night, the house had been tightly closed, and in the morning, a heavy coating of frost covered nearly all the windows. In about two and a half hours, after a single thorough airing of the house (upstairs as well as downstairs), the frost had disappeared from all but the lower panes of one bay on the windward side. In this case, the frost actually evaporated from the windows without first melting and running down the glass.

The most effective time for airing a house is just before the retiring hour at night, for it is usually at that time that the moisture content of the inside air is greatest because of the gradual increase throughout the day. During the night, with the occupants in bedrooms shut off from the rest of the house, and with other moisture sources cut off, the contained air will hardly increase enough in moisture content to bring the dew point high enough to permit condensation to take place.

[To be continued]

## A Combination that Spells Better Business for You—



## The ROUND OAK AIR CONDITIONER and the Complete Round Oak Line of Cast Iron and Steel Furnaces

The name "ROUND OAK" is the strongest assurance any dealer could have that this new air conditioner is

engineered right, and made right, for practical, dependable service. You know it will provide positive air circulation . . . thoroughly filter and purify the air . . . increase furnace efficiency . . . reduce fuel bills.

You can cash in on ROUND OAK'S 64-year reputation for quality, when you handle this ROUND OAK air conditioner, AND the complete ROUND OAK furnace and air conditioning line. With Round Oaks you can supply ANY type of warm air heating plant desired—whether cast iron or steel—for solid or liquid fuel.

### DISTRIBUTORS

Haw Hardware Company, Ottumwa, Iowa

The MacIntyre Company, Fond du Lac, Wisconsin

Sioux Falls Corrugating Co., Sioux Falls, S. D.

Waterloo Metal and Mfg. Co., Waterloo, Iowa

W. M. Dutton & Sons Co., Hastings, Nebraska

Sam H. Kimbler, Denver, Colorado

Anchor Lite Appliance Co., Pittsburgh, Pa.

Large capacity, slow speed blower, adjustable drive, electric motor; exceptionally quiet in operation; extra large filter capacity; plain or two tone green baked WrinkleLac finished cabinet.

- THE OIL-MASTER
- THE COAL-MASTER
- THE MOISTAIR BOILER-PLATE
- THE MOISTAIR BLENDED IRON

All models available in a full range of sizes. Round casing, or square cabinets offered in baked two tone green WrinkleLac finish.



## ROUND OAK COMPANY

Stoves - Ranges - Furnaces - Air Conditioners Since 1871  
 DOWAGIAC, MICHIGAN



# YOU'LL NEVER HAVE TROUBLE WITH THE SPRAY WHEN THIS PAIR GOES ON THE JOB

**No. 290 "GENUINE DETROIT" SPRAY NOZZLE**  
—If the job calls for spray and you want to be sure it will function properly without service, put in No. 290 "Genuine Detroit" Nozzles which are self-cleaning. Each time the control shuts off the spray the No. 290 automatically reams out its orifice . . . no scale or sediment is allowed to remain . . . no chance for a clogged nozzle. And it can be regulated by the adjustable baffle for any volume desired.

The No. 290 can be used with hot and cold water and can be installed in any position—straight or side, male or female connections; thus a number of units can be connected in series without a special header.

**No. 683W SOLENOID**—The No. 683W "Genuine Detroit" Solenoid Valve controls electrically the flow in water lines, or through water cooled condensers. Closing the circuit energizes the coil, lifts the plunger and opens the valve. Breaking the circuit closes the valve. It draws a minimum amount of current and will operate continuously without overheating.

Its moisture proof housing, special inserted seat construction and its abrasion and corrosion resistant needle assure maximum service life. A. C. hum has been practically eliminated. The No. 683W is furnished in three regular orifice sizes: 3/32", 3/16" or 1/4".



No. 290 "GENUINE  
DETROIT" SPRAY  
NOZZLE



No. 683W "GENUINE  
DETROIT" SOLENOID

**DETROIT LUBRICATOR COMPANY**

NEW YORK, N. Y. — 40 West 40th St. • CHICAGO, ILL. — 816 S. Michigan Ave.  
LOS ANGELES, CALIF. — 320 Crocker Blvd.  
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5900 Trumbull Avenue  
DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION  
Canadian Representative — RAILWAY AND ENGINEERING SPECIALTIES LIMITED, Montreal, Toronto, Winnipeg



## Oil Burning in Residences

(Continued from page 48)

**Table 5—Draft Readings Obtained in the Smoke Pipe and in the Combustion Space**

Draft Inches of Water	Steam		Hot Water		Warm Air		Total	
	Front	Rear	Front	Rear	Front	Rear	Front	Rear
Below 0.02..	6	3	1	1	..	..	7	4
0.02 - 0.05..	26	10	7	5	5	6	38	21
0.05 - 0.10..	11	27	2	14	5	18	18	59
0.10 - 0.15..	4	19	1	4	2	8	7	31
Above 0.15..	1	15	..	1	..	2	1	18
	.0448	.111	.04	.07	.06	.086	.0468	.0965
	48	74	11	25	12	34	71	133

**Table 6—Tabulation of Methods of Supplying Domestic Hot Water**

Types	Steam	Hot Water	Warm Air	Total
Fire Coil .....	8	9	18	35
Gas .....	14	10	13	37
Coal .....	2	0	0	2
Indirect .....	36	4	0	40
Oil .....	6	3	1	10
None .....	8	2	2	12
Total .....	74	28	34	136

The average drop in temperature through the heat savers was 258 F. For the three warm air systems, this drop was 365 F. The average flue gas temperature for all installations was 625 F. when the temperatures taken after the heat savers in these six cases are used, as compared to an average of 634 F. when the temperatures at the outlets of the boilers and furnaces

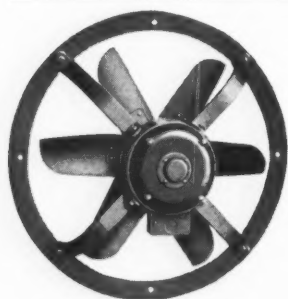
are used in all cases. The values on Fig. 8 are those obtained at the boiler or furnace smoke connection. In one case with added heat absorption surface the loss to the chimney was 10 per cent, one per cent lower than the loss quoted in connection with Fig. 8.

### Flue Gas Temperature

Table 4 shows a summary of the survey results as to CO<sub>2</sub> and flue gas temperature separated as to installations made in the three years before the survey and those made previous to that time. For the newer installations the flue gas temperature averaged 635 F. and the CO<sub>2</sub> 7.7 per cent. These values for the older installations were 633 F. and 8.0 per cent. The separation was based on the time of burner installation. In some cases this coincides with the time of the heating plant installation and in other cases the burner was placed in an older heating plant. The results indicate no great change in the efficiency of the newer installations.

The averages of 7 boiler-burner units recently installed were found to be 529 F. flue gas temperature and 9.3 per cent CO<sub>2</sub>. Two installations of one manufacturer showed an average flue gas temperature of 445 F. and 7.2 CO<sub>2</sub>, and four of another manufacturer showed an average of 629 F. and 11.3 per cent CO<sub>2</sub>. In each case this corresponds to about a 21 per cent stack loss.

The draft readings obtained in the combustion space and at the smoke pipe connection are shown in Table 5. The draft loss through 12 warm air plants where the draft was observed at the two locations averaged



## Peerless TWO NEW FANS FOR 1936

"Model 600" a low-priced quality exhaust fan: 16, 18 and 24 inch diameters. Fully enclosed long hour duty motor. Ball bearing thrust, fan may be operated in any position. Heavy "Dural" blade. Very attractive color scheme. Quiet operation.

## ATTIC VENTILATOR FAN

Heavy pitch low speed fan for extremely quiet operation. Cushion mounted long hour duty motor. Adjustable pitch motor pulley for exact regulation of capacity for every installation. Automatic belt tension device insures correct belt pull at all speeds. Fully enclosed to prevent injury to children. Spring suspension of unit from roof prevents disturbance in quiet night hours. Complete with unit shown, canvas boot, suspension springs, louver, and screen to prevent entrance of insects.

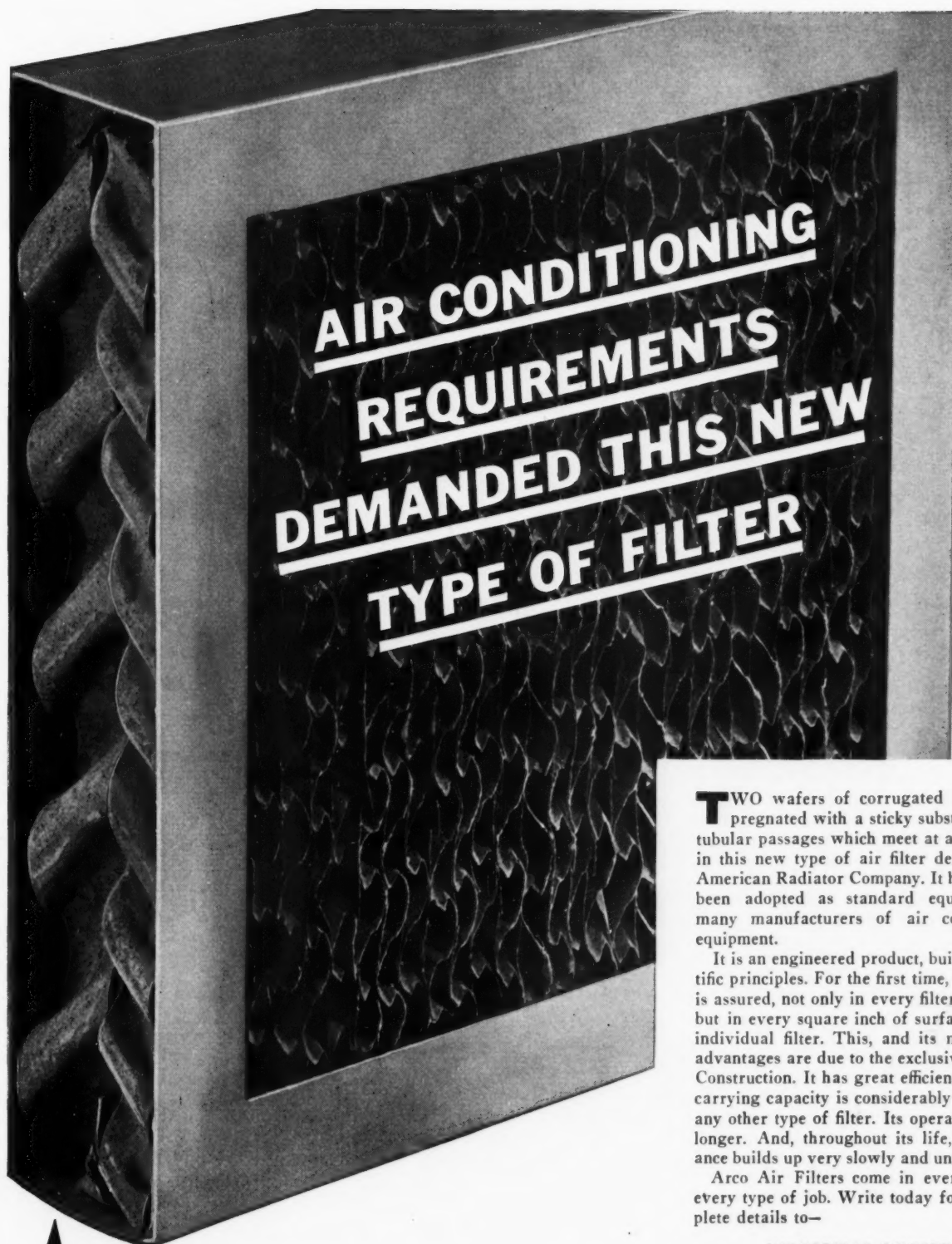
ASK FOR BULLETIN 208

**THE PEERLESS ELECTRIC CO.**

Fan and Blower Division

Warren, Ohio





THE "V" ANGLES  
GET ALL THE DIRT!

**T**WO wafers of corrugated board, impregnated with a sticky substance, form tubular passages which meet at a 90° angle, in this new type of air filter developed by American Radiator Company. It has already been adopted as standard equipment by many manufacturers of air conditioning equipment.

It is an engineered product, built on scientific principles. For the first time, uniformity is assured, not only in every filter of a type, but in every square inch of surface on each individual filter. This, and its many other advantages are due to the exclusive Cellular Construction. It has great efficiency. Its dust carrying capacity is considerably more than any other type of filter. Its operating life is longer. And, throughout its life, its resistance builds up very slowly and uniformly.

Arco Air Filters come in every size for every type of job. Write today for the complete details to—

INDUSTRIAL DIVISION  
**AMERICAN RADIATOR COMPANY**

40 West 40th Street, New York, N. Y.

Division of AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

# ARCO AIR FILTERS

USED IN AMERICAN RADIATOR CONDITIONING SYSTEMS



**Table 7—Tabulation of Fuel Costs on a Room and Square Foot of Floor Space Basis**

	Steam		Hot Water		Warm Air		All Systems	
	Oil	Solid Fuel	Oil	Solid Fuel	Oil	Solid Fuel	Oil	Solid Fuel
No. of Systems with Comparative Cost Data	24	24	11	11	17	17	52	52
Ave. Cost per Sq. Ft. of Floor—								
Cents per Yr.	8.26	8.13	7.56	7.37	7.11	8.81	7.74	8.18
No. of Systems with Cost Data	55	28	19	11	26	23	100	62
Ave. Cost per Sq. Ft. of Floor—								
Cents per yr.	8.35	8.23	7.23	7.37	7.07	8.82	7.82	8.30
Minimum Cost—								
Cents per Sq. Ft. per yr.	4.24	3.5	4.5	4.5	4.1	3.1	4.1	3.1
Maximum Cost—								
Cents per Sq. Ft. per yr.	15.2	18.8	10.70	10.4	11.8	14.5	15.2	14.5
No. of Systems with Comparative Cost Data	24	24	10	10	18	18	52	52
Ave. Cost—Dol- lars per Room per yr.	16.80	16.21	16.03	15.96	14.69	17.42	15.93	16.58
No. of Systems with Cost Data	50	28	20	10	27	21	97	59
Ave. Cost—Dol- lars per Room per yr.	18.75	16.48	15.11	15.96	14.38	17.17	16.78	16.63
Minimum Cost— Dollars per Room per yr.	9.60	10.70	7.00	10.50	11.20	9.00	7.00	9.00
Maximum Cost— Dollars per Room per yr.	33.90	32.00	22.50	26.50	20.00	30.00	33.90	32.00

0.026 in. water. In 43 steam plants the draft loss was 0.042 in. water and in 8 hot water plants was found to

be 0.037 in. water. Usually a high reading in the combustion space would be associated with a low CO<sub>2</sub> reading. The particular weather conditions at the time of taking the reading affect the draft especially if a draft regulator is not installed. Eighty-five installations had draft regulators and 56 were without these useful devices.

The number of installations having some means of humidification was 63 as against 70 without any such means. In warm air plants, two out of 33 had no humidification method, in hot water plants 13 out of 23, and in steam plants 55 out of 77 had no means of supplying moisture to the air. Table 6 shows the means of supplying hot water for tap use. Seventeen boiler installations used coils in the combustion space as compared to 40 using indirect heaters with boiler water as the heating medium.

Yearly costs of heating were obtained in all cases where the owners had kept careful records and in many cases these were checked with fuel companies' records of deliveries. Twenty-seven reported savings which averaged 29 per cent with the changing from hand-fired solid fuel to oil burning. Sixteen reported the same cost with the two methods of heating and 16 reported an increased cost of 23 per cent with the change from solid fuel to oil burning. In some of the cases where savings were obtained a new boiler, furnace or heat saver was installed at the time of change.

Table 7 presents the cost data on a basis of each square foot of floor space in occupied rooms and also on a basis of cost per room. Since types of construction

## PROTECT YOUR HUMIDIFIER PROFITS WITH SKUTTLE'S 20 YEARS EXPERIENCE

Skuttle Automatic Humidifiers give complete satisfaction to users and enable you to make and keep a generous profit because their exclusive features are based on 20 years of practical humidifier experience.

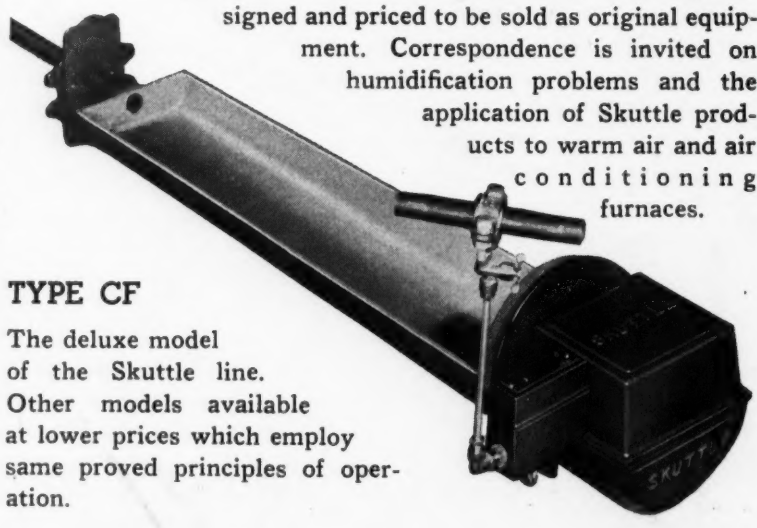
Skuttle has defeated "liming"—the arch enemy of reliable humidifier operation. Both float and valve are located away from furnace heat, preventing lime deposits on moving parts. Valves are rubber seated . . . adverse water conditions cannot cause leaky valves. An adjustable float permits accurate adjustment to obtain correct evaporating rate in small or large homes.

Write for price list and descriptive literature.

**DISTRIBUTORS WANTED**

### MANUFACTURER'S SERVICE

The J. L. Skuttle Company offers a complete line of automatic humidifier parts and controls, designed and priced to be sold as original equipment. Correspondence is invited on humidification problems and the application of Skuttle products to warm air and air conditioning furnaces.



**TYPE CF**

The deluxe model of the Skuttle line. Other models available at lower prices which employ same proved principles of operation.

**THE J. L. SKUTTLE COMPANY, 4308 W. Fort Street, Detroit, Michigan**



*Harold Mueller, president, L. J. Mueller Furnace Company, Milwaukee, Wisconsin, goes over the new Mueller line of heating and air conditioning equipment with Mr. A. L. McKinstry.*

## PLAIN TALK BY HAROLD MUELLER

**W**HEN I was a little shaver running around my grandfather's furnace shop, he used to tell me, "Boy, if you build an honest product and sell it honestly, you'll never have to worry about keeping customers. Even if you have to charge a little more for good workmanship, your customers will remember quality long after they forget price."

That was a mighty good policy 79 years ago and it's good today. It's like the constitution—a little old-fashioned, but still reliable.

Fundamentals don't change even though ideas and living standards do. In the seventy-nine years my family has been in the heating business a lot of changes have taken place. Why, in the last ten years alone, ideas about home heating have done a complete about face.

Homes built according to 1936 standards will completely outmode those of 1926. One major change is the public's opinion about heating. Today the call is for automatic heat and air conditioning.

Alert homebuilders know that modern heating and air conditioning systems are far ahead of the old-fashioned heating plants they have supplanted.



**Air-Conditioning Oil Furnace.** We are proud of this modern, compact unit which represents the first complete departure from conventional furnace design in a direct-fired forced air heating and air conditioning plant.

And that is where we fit in. During the last ten years our engineers have pioneered automatic heating and air conditioning. Today we are ready with a complete line of Climator equipment, Gas Era Furnaces and Boilers, the great new Air Conditioning Oil Furnace—all newly styled and attractively priced. Be sure to get all the facts about this new equipment—and of course we still continue to produce the standard line of Mueller coal-fired furnaces, registers and fittings.

Be ready for a big year in 1936. Come along with us. Write today.

*H. J. Mueller*  
PRESIDENT

# MUELLER-MILWAUKEE

## AIR CONDITIONING SECTION

60

May, 1936

vary greatly, the cost on either of these bases would vary considerably, even should the efficiency of the heating plant be the same in every instance. The data are shown in two ways: for only the installations in which records were obtained for the two types of fuel and for all cases where cost records were obtained. In many instances the original installation was arranged

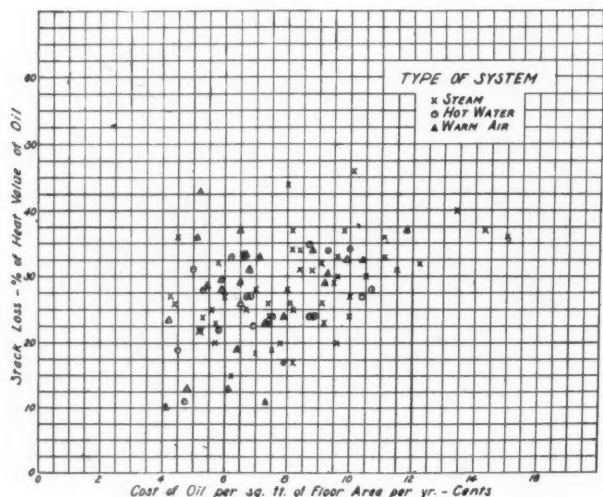


Fig. 9—Relation between the cost of oil for heating and the measured stack loss

for oil burning and therefore no comparison was available.

Based on 52 installations the cost per square foot of floor space per year with oil heating was 7.7 cents and

with solid fuel 8.2 cents. The cost per room per year with oil burning figured out as \$15.93 and with coal \$16.58 for cases reporting costs for both fuels. These costs of course depend upon the unit price of fuel during the years involved. The oil burning period of years was immediately previous to the time of the survey and the solid fuel burning previous to this variable number of years. It is, therefore, very difficult to know the unit prices of the fuels involved.<sup>2</sup> The figures when placed on the room basis are subject to the variations of room sizes in various types of houses. This accounts for some of the variation in costs per room which varied from \$7.00 to \$33.90 with oil burning and from \$9.00 to \$32.00 with hand-fired solid fuel. The average cost of oil heating was \$16.78 for the 97 cases in which oil burning costs were obtained on a room basis.

In 59 cases where solid fuel costs were given, the average cost per room was \$16.63. Since the same installations are not involved in the two sides of this comparison, the size of the rooms involved would influence the results. On a square foot of floor area basis, the costs were 7.8 cents per year for oil in 100 cases as compared to 8.3 cents per year for 62 cases with solid fuel which check very closely with the figures also given in Table 7 for the 52 cases in which oil and solid fuel costs were given for the same installations.

On Fig. 9 are plotted the points representing the cost of heating with oil and the measured stack loss. These

<sup>2</sup>The average prices per ton for solid fuels in Madison for the 4 years 1929 to 1933 were as follows: Illinois bituminous, \$8.44, semi-bituminous egg size, \$11.94, coke, \$12.25, anthracite pea and nut, \$15.94; the arithmetical average of these is \$12.14. The average prices per gallon for domestic grades of fuel oil in Madison for the 4 years 1930 to 1934 were as follows: No. 1—7.3c, No. 2—6.5c, No. 3—6.4c, and No. 4—6.1c; the arithmetical average of these is 6.6c.

# Standard Equipment

## with BRUNDAGE



**BRUNDAGE FURNACE BLOWERS** are nationally known for their high quality and excellent performance. What stronger endorsement could be found for American Furnace Filters than the fact that Brundage has used them as standard equipment for their furnace blowers since 1932.

**[Write for Bulletin 117-C]**

**American Air Filter Co., Inc.**  
INCORPORATED  
113 Central Avenue, Louisville, Kentucky  
In Canada—Darling Bros., Ltd., Montreal, P.Q.



**FURNACE FILTERS**



I'M AN IMPORTANT  
MAN IN THE  
WILL-BURT  
ORGANIZATION..  
..I'M A WILL-BURT  
DEALER.



THE Will-Burt organization ranks among the leaders in the industry in size, age and financial responsibility; yet it is not so big that a dealer loses his identity in it.

This company recognizes that the dealer occupies a most important place in the organization and that the success of the company is best measured by the success of its dealers. That is why every Will-Burt dealer receives the fullest attention and cooperation,—why we spare no effort to make each individual dealer prosper in his connection with the Will-Burt organization.

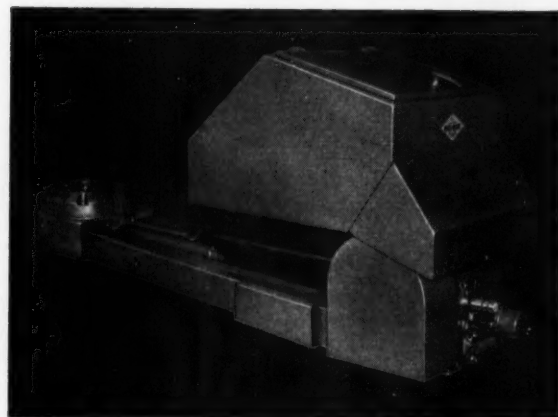
The uniform merit of the Will-Burt line affords a substantial base on which to build. Scientific design, quality materials and careful workmanship combine to make domestic and commercial stokers which have commanded the respect of every one who has become well acquainted with them.

We shall be glad to explain the details of the Will-Burt Proposition to dealers who are interested in building a profitable and enduring stoker sales business.

## THE WILL-BURT CO.

Automatic Coal Burner Div.  
Orrville, Ohio

Manufacturer of Will-Burt Domestic  
and Commercial Stokers with the  
original Automatic Air Control.




## MONCRIEF "ARISTOCRAT"\* OIL-FIRE AIR CONDITIONING SYSTEM

High efficiency . . . unmatched economy . . . wonderful convenience . . . all the qualities which have made the Moncrief "Aristocrat" Oil-Fire an outstanding air conditioning unit likewise distinguish this new model. New unified design and ultra modern lines create a superb effect . . . Patented Wind Box which distributes air uniformly over surfaces of heating unit continues an exclusive feature. Four sizes.

## New!...MONCRIEF "SPECIAL"\* Oil-Fire Air Conditioning System

*Particularly designed for Small Homes.*

More compact but contains all the essential features of the "Aristocrat" model. Beautifully finished. Efficient. Two sizes— $\frac{3}{4}$  gallon and one gallon per hour fuel consumption.

 Neither the "Aristocrat" nor the "Special" Oil-Fire System is furnished with oil burner. Both are designed for use with any standard type of oil burner.

## MONCRIEF Air Conditioning Systems For Coal and Gas

These two units, each specially built to burn the fuel intended for it with greatest efficiency, complete the Moncrief line of practical moderately priced air conditioning systems for the home. Write for descriptive literature.

## MONCRIEF Air Conditioning PIPE and FITTINGS

. . . have patented lock joints . . . Make for a neater, more efficient air conditioning installation.

The Henry Furnace & Foundry Co.  
3473 E. 49th St. Cleveland, Ohio

measured stack losses were obtained from Fig. 8 by the use of the CO<sub>2</sub> and flue gas temperature readings for each installation in which oil heating costs were known. There would be a minimum cost of heating for every house construction even with complete utilization of the entire heating value of the oil. With a given construction the greater the stack loss the higher the cost of heating. In general the distribution of points indicates that usually a high stack loss means a high cost of heating. That a few points indicate low costs of heating in spite of a high stack loss is understandable by several reasons. The efficiency of oil burning might have been poorer at the time of test than over the period of years in which the yearly oil costs were taken. The economy of heating might be secured in certain cases by under heating parts of the house. The house may have been well insulated so that the heat losses were low or the losses may have been largely recovered as useful heat from the smoke-pipe and chimney.

### Conclusions

A study of the losses during off-periods of oil burner operation on a laboratory set up indicated that a saving of 9 per cent resulted from the prevention of air circulation through the combustion space during these periods. This saving was found at about one-third load with the oil burner adjusted to run continuously when carrying full rating.

A similar study in a residence indicated under fairly average heating conditions for the locality an 8.9 per cent saving with an automatic off-period damper with a continuously maintained room temperature of 70 F.

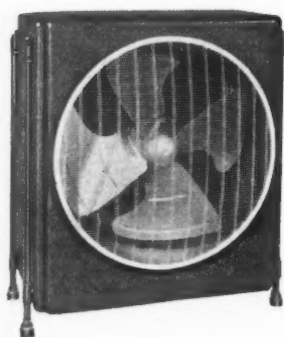
although unequal sun intensities probably make this figure slightly high. With lowered night temperatures, the saving found due to the off-period damper was 7.2 per cent. This is considered low because the damper was controlled by the room thermostat and remained open during the off-periods of the warming up period. It is believed that the saving has some direct relation to the number of starts and accordingly the saving in connection with dual temperature operation would be less than with continuous room temperatures.

The off-period loss and therefore the saving possible with the use of an off-period damper depends on many variables, some of which are: the heat capacity of the brick work, the length and frequency of running periods, adjustment of the draft as to intensity, and the resistance to gravity air flow if the air supply path and of the heat absorption passes. The savings reported in this paper although applying strictly to the installations tested are considered to be an indication of the savings possible in somewhat better than average installations. Where conditions are less favorable to efficiency the use of the damper would result in a greater saving. The question of safety arising in the need for ventilation of the combustion space during off-periods to clear it of combustible gases has not been studied. This question requires considerable attention before off-period dampers might be used generally.

A survey of some 140 residence installations indicated a stack loss of 27 per cent as determined by a CO<sub>2</sub> average of 7.8 per cent and an average flue gas temperature of 634 F. The presence of unburned fuel

(Continued on page 91)

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**Converting Gravity to F. A.***(Continued from page 37)*

This isn't an ideal arrangement of course, but it is often extremely difficult to install a proper vent flue in an old house and the method here suggested as an alternative, at least accomplishes the purpose very well. In this series of articles, we are not outlining *ideal* systems such as one would like to install in new homes. We're trying to make clear the decidedly **PROFITABLE** work which can be undertaken in **IMPROVING** many of the 6,000,000 existing gravity plants in the United States by converting them into forced air systems. If we attempt to tear down the house so as to install an ideal mechanical system, we lose the job and the profit it would bring; our customer loses the many benefits which the *improvement* would give him.

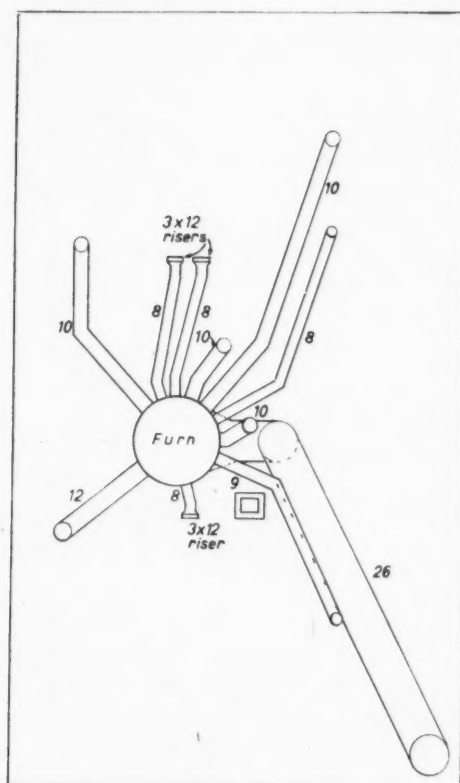


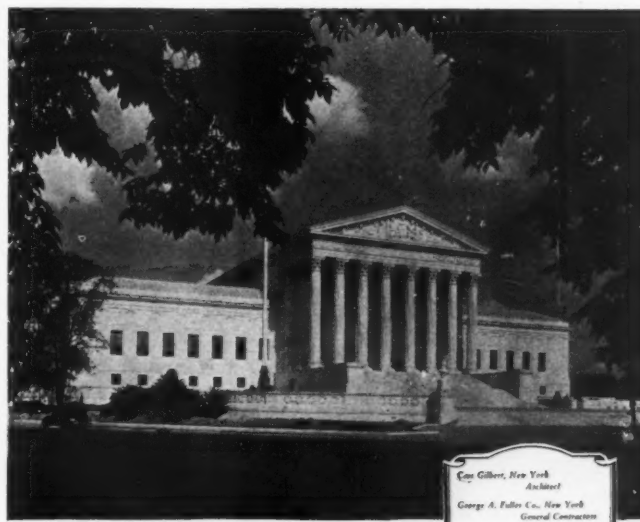
Fig. 3-A—  
Basement  
plan showing  
original  
gravity system  
with one large  
return air  
pipe

Bed rooms too, should have registers instead of faces, if it is customary to sleep with the windows thrown open. Then on winter nights when they close the bed room door and open the windows, they can also close the valves in both the warm air supply and cold air return registers and not try to heat all out doors.

Working back toward the furnace, the next room is the bath (room 6) for which Table II shows a required duct area of 11 square inches and a register free area of 14 square inches. Where a forced air plant is being installed in a new house, provision should be made for a vent in the bath just as was recommended for the kitchen, but the structural difficulties encountered in venting such a room in an old house may make the cost out of proportion to the benefits. In conversion jobs, it is usually satisfactory to add the return air requirements of a bath to one of the adjoining rooms.

In this case, we'll add it to room 4. Table II shows room 4 requiring 35 square inches of duct area. Add-

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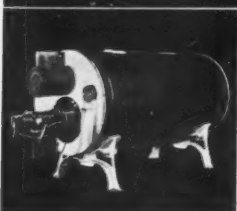
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TABLE II

I	II	III	IV	V	VI	VII
Room	Cubic Content	Exposed Walls	Glass Surface	Factor from Table I	Return Air Duct Area Sq. In.	Return Air Face Area
1	2140	2	Normal	0.036	77	100
2	5700	See Text		0.036	205	267
3	1460	1	Normal	0.024	35	46
4	1460	1	Normal	0.024	35	46
5	1400	2	Large	0.042	59	77
6	370	1	Large	0.03	11	14
7	1300	2+	Normal	0.04	52	68

ing to this, the 11 square inches for the bath, we find that the return air duct from room 4 should have  $35 + 11 = 46$  square inches of cross sectional area. The free area of return air grille in room 4 would be  $46 + 14 = 60$  square inches.

Since room 3 as shown in Table II, requires 35 square inches of duct area, we have a total of  $46 + 35 = 81$  square inches of return air capacity joining the return air trunk line at this point. The remote trunk section required 100 square inches and applying the percentage reduction method again, we find that the total area of the trunk to handle return air from rooms 3, 4, 5, 6 and 7 will be:

$$0.9 \times (100 + 81) = 163 \text{ square inches.}$$

If the depth of the duct is limited to 8 inches, its dimensions to provide 163 square inches of capacity, will be 21-in. by 8-in. (Fig. 3B).

Turning now to the front of the house, Table II shows that room 1 requires a duct area of 77 square inches and room 2, 205 square inches. The cubic content (5700 cu. ft.) shown for room 2 includes the second floor rooms to which warm air is supplied, but from which no *direct* return ducts are taken. When it can be done at moderate cost, returns should be brought down through studding spaces (or first floor closets) direct from second floor rooms; but in revamping old gravity plants, unless the house itself is being remodeled, the expense is liable to be prohibitive. In such cases it is **IMPORTANT** that a return air face of generous size be so placed as to catch the cold air which will spill down the stairway.

The original gravity return air face meets that requirement in this house very nicely and two joist spaces are panned to carry this air across to the new return air trunk from the front of the building.

The number of square inches of return duct area required in this trunk will be, according to the percentage reduction method:—

$$0.9 \times (77 + 205) = 254 \text{ square inches}$$

If the depth of the duct is to be 8 inches, its width will be  $254 \div 8 = 32$  inches. (Fig. 3B).

In converting this plant from gravity to blower circulation the warm air pipes and registers are left as they were originally; the only change has been the addition of a blower and provision for positive withdrawal of cold air from every first floor room except the bath. The cost of such a change is moderate, especially in view of the improved comfort conditions, health, cleanliness and fuel economy of which the owner may be assured. If there is no objection to the original 26-inch return pipe (Fig. 3A) from the front of the house, it could be retained and the cost of about 20 feet of 32-in. x 8-in. could be saved.

## A Zone Control System

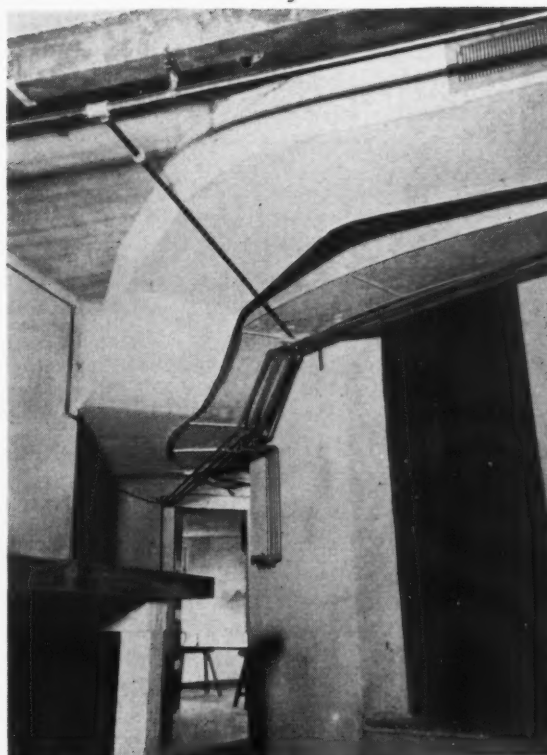
(Continued from page 35)

covered with 1/2-inch of air cell asbestos, in turn covered with 12-pound asbestos paper and over this a 6-ounce canvas was applied and later painted to give a smooth, dirt-free surface.

Inspection of the basement plan shows several features of interest. For example, the round pipe supplies to the first floor gallery are both long and devious, particularly the end pipe. It comes off the stub main of zone C, runs across joists, then between joists, then across joists letting off a small branch and finishes between joists through the game room. The other branch to the gallery runs between joists its entire length, but ducks under main supply and return lines. Another interesting gathering of branch round pipes is made at the end of trunk C where four round pipe branches pass between joists to partitions around the stair well. Mention should be made of trunk line D, which is both long and also bends around the stair tower to finish as round pipe branches, two of which cross the work room between the joists.

While the two return lines are long, they are unusually compact for such a large house. There are no restricted branches—the smallest cross section of the return system being the stacks from the second floor.

The data sheet shown gives the coefficients and factors used for the materials of construction. As shown, the Btu. loss in column 11 has a 10 per cent safety



Zone D supply main and return line from study wing curving around the base of the round stair well in the basement.

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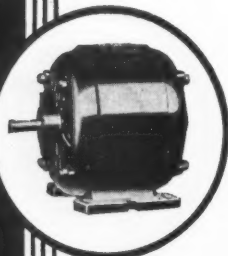


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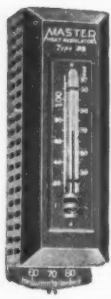
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factor added to arrive at the total Btu. requirement in column 12. Attention is called to column 13, which carries a percentage to be added to compensate for temperature loss in ducts. This item was considered important in this particular job because of the length of many of the supply runs. It will be noted that this percentage varies from room to room.

The percentage to be added is calculated by assuming that there will be a temperature drop equal to 2 per cent of the heat for each 10 feet of straight pipe, 2 per cent for each 90 degree elbow, 1 per cent for each 45 degree elbow or turn. A 20-foot pipe with one 90 degree and two 45 degree elbows would therefore figure 6 per cent loss. Mains are sized for 550 f. p. m.; branches for 500 f. p. m.; stacks for 450 f. p. m.; registers 300 f. p. m.

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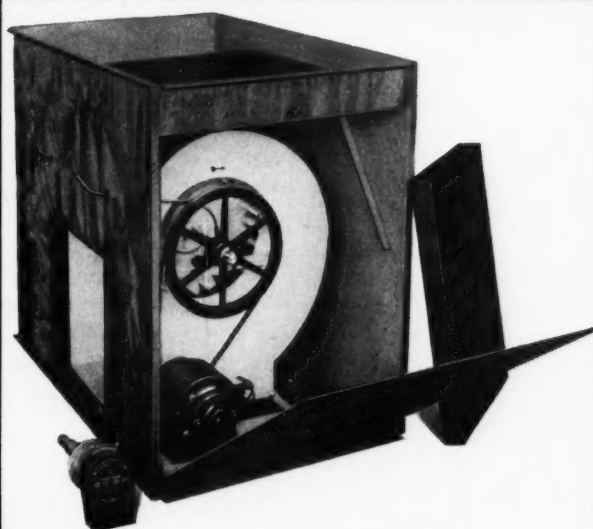


Round pipe branches at end of rectangular section of Zone trunk C (see basement plan). All supply pipes are insulated with air cell, paper and canvas painted.

valve opens, igniting each section progressively, and closes the circuit so that the blower can run providing bonnet temperature is up to a pre-selected temperature. As temperature builds up the blower starts. As the gas valve opens, the zone damper motor also opens the damper to the zone calling for heat. When the zone thermostat is satisfied the gas valve closes and the blower stops. Should there be heat enough remaining to push the bonnet temperature to around 300 degrees, the blower will start and continue until temperatures drop back to 200 to 250 degrees.

It may be of interest to readers that George Ballard, the contractor, also placed all the flat copper decks, valleys, gutters and conductors. Also he placed the handmade tile used on the pitched roofs, the appearance of which may be seen in the exterior photograph of the garage and study wing of the residence.





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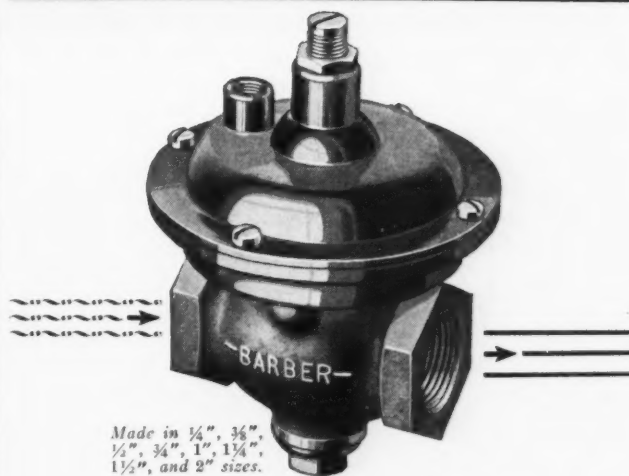
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## Konzo on Registers

(Continued on page 33)

into a room, whose temperature is maintained at approximately 80 degrees F. the temperature gradient from the floor to the ceiling is of the order of 4 degrees F. This value is decidedly smaller than the temperature gradients existing in winter heating systems, in which the temperature gradient may be as large as 10 to 15 degrees in severely cold weather.

2. In the second place, the temperature gradient which exists in a room which is being cooled is not undesirable. A hot ceiling in the case of a room being heated is accompanied by large heat losses from the structure, but a hot ceiling in the case of a room being cooled is not necessarily accompanied by a large heat gain, except when the ceiling is below a room which is being cooled. Similarly, a cool floor in the case of a heating installation tends to produce discomfort for the occupants, whereas the opposite is true in the case of summer cooling installations.

A consideration of these two factors serves to explain why the criterion used in evaluating the effectiveness of a register for winter heating purposes cannot be applied in the case of registers to be used for summer cooling. In simplest terms,

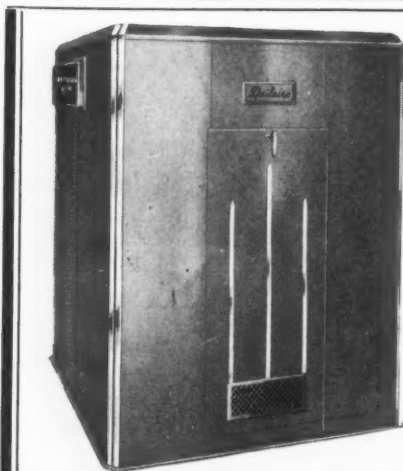
the difference between the two cases can be illustrated in the form of two questions:

- a. For winter heating will the given register produce a small temperature gradient from the floor to the breathing level without the accompaniment of objectionable drafts?
- b. For summer cooling will the given register deliver the air into the room without the accompaniment of objectionable drafts?

### Registers for Combined Heating and Cooling

Much interest has been shown in the few installations which have attempted to provide for combined winter heating and summer cooling with a central, forced-air duct system. The question arises as to whether the registers for such combined systems should be located in the baseboard, in the sidewall, in the ceiling, or at both the baseboard and sidewall. Undoubtedly, installations can be made to operate successfully with the registers located at any one of the locations enumerated. Installations are in use, which have been put in according to the judgment of each individual designer, showing a wide diversity in the locations of the registers. There is no unanimity of opinion in the matter, and as long as individual variations exist in the requirements of each installation there is little hope that the matter can ever become standardized.

With these restrictions in mind, the following comments are offered. These summarize some of the factors that should be taken into consideration



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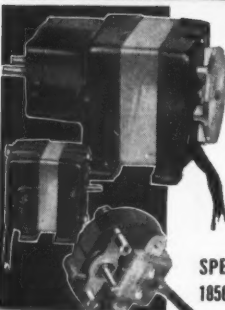
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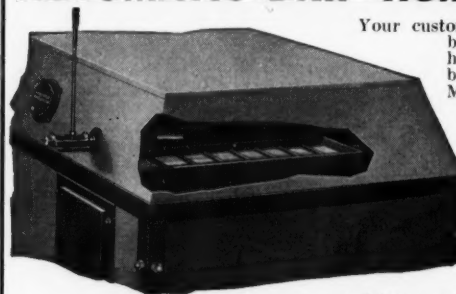
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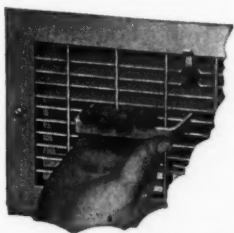
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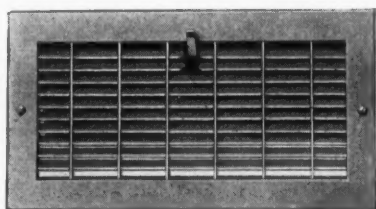
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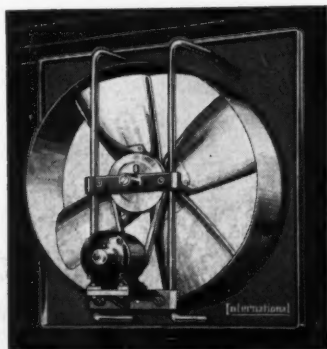
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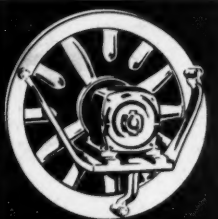
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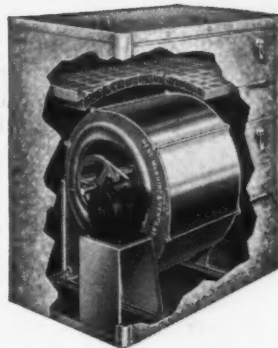
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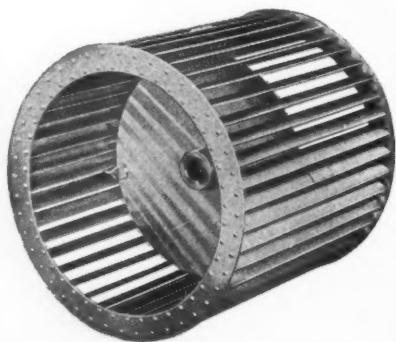
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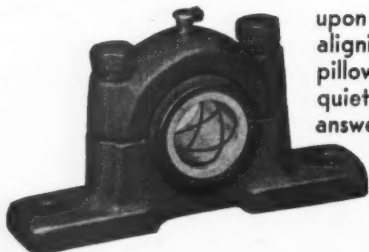
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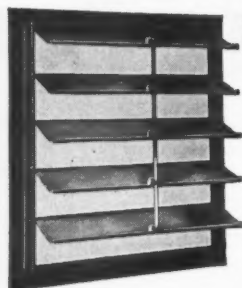


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Air Velocity Meter  
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in the design of a combined heating and cooling system.

1. One of the first matters to be considered is the relative importance of the heating function of the system as compared with the cooling function. In other words, what proportion of the year will be devoted to heating, and what proportion to cooling? A house located in the northern latitudes will have a heating season that is approximately three times as long as the cooling season. It would be logical in this case to emphasize the heating portion of the combined season. On the other hand, the opposite set of conditions might prevail in a structure located in a warmer climate.
2. A dual system of registers, such as is shown in Fig. 4f, in which the warm air is supplied by baseboard registers of the diffusing type and the cool air is supplied by high sidewall registers, would probably provide the minimum temperature stratification in the winter, and the best air distribution in the summer. In addition, if each register were provided with regulating dampers that could be locked into position, the entire duct system could be balanced independently for winter and summer conditions, so that a minimum adjustment of the duct system would be required at the change of seasons.
3. The use of a dual system of registers entails an expense that may not be warranted in the case of most installations, and a single location of the register for both heating and cooling may be preferred. The use of the high sidewall location would provide for good distribution of the cool air in the summer, and would prove satisfactory for winter heating if the register velocity was greater than approximately 500 to 600 feet per minute.  
The baseboard location, using the deflecting type register which diverts the air towards the floor will prove satisfactory for heating purposes and fairly acceptable in the summer. The draft conditions could be improved for summer cooling work if the air could be deflected towards the ceiling.
4. In combined systems, some adjustments of the dampers in the duct system will probably be found necessary at each change in the season. In the winter the warm air which is introduced on the first story tends to rise to the second story, whereas in the summer the cool air which is introduced on the second story tends to drop towards the first story. In addition, the distribution of the cooling requirements for the various rooms in the structure will be different from that of the heating requirements. Both factors make seasonal changes in the bal-

(Continued on page 72)

## Cooling K. C. Residence

(Continued from page 31)

were mostly used to exhaust the warm air near the ceilings so that the cool air from downstairs could rise to the second floor. With both systems in operation, it was very noticeable how quickly the second floor cooled down to within two degrees of the first floor. Controls for these two fans were placed in the hall on the second floor.

After this problem had been solved, we turned our attention to the compressor in the basement. It had been installed on four concrete blocks to raise it off the basement floor as a matter of convenience in cleaning. The entire set-up failed to have an appearance in keeping with the modern idea of beauty as well as utility. So we designed a cabinet that would totally enclose the compressor, motor, fans and condensing coils. The body of the cabinet was made of presswood with an angle iron frame. The top was made in the form of a hinged cover for oil-



Exterior of house in which cooling system was installed.

ing and inspection, and the entire front panel was made removable for repairs. The back of the cabinet was extended up high enough to provide space to install all the instruments instead of mounting them on a pine board nailed to the brick chimney.

Besides enclosing the compressor, this cabinet had several other functions, one being it was a safety measure as it kept children and inquisitive people from getting their fingers in the machinery. Then we found that we could pocket the heat given off by the motor, the compressor, the condensing coils and the copper tubing on the high side of the compressor, and convey this heat to the chimney by means of a 5-inch common stove pipe. However, in the summer time this plan did not work out so well as it was cool in the basement and the heated air was very sluggish in getting to the chimney. This was overcome by installing a small 5-inch fan in a specially made elbow next to the chimney, and after this was turned on, the heat problem in the cabinet was solved. Of course the bottom of the cabinet was open to allow free air to all parts of the compressor.

As one looks at the instrument board of the cabi-

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For A.C. Fan Motors up to  $\frac{3}{4}$  H. P.

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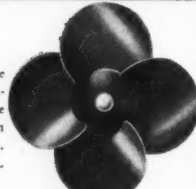
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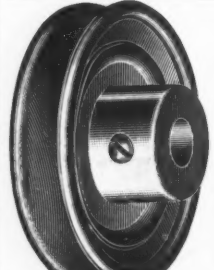
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net, one is reminded of the instrument board of the modern automobile. Here we have: first, the pressure water regulator; next, the low-side pressure gauge; next, the temperature of the water off the condensing coils; then, the high side pressure gauge; next, the high and low pressure cutout switch; and last, the magnetic switch.

### Cost of Installation

Compressor, coils, valves, elec. wiring.....	\$775.00
Ventilating units in attic.....	135.00
Compressor cabinet .....	35.00
Fan for cabinet.....	1.50

### Cost of Operation

	1934	Summer 1935
Electricity .....	\$ 8.28	\$4.33
Water .....	4.23	2.17
Repairs .....	None	None
<b>Total .....</b>	<b>\$12.51</b>	<b>\$6.50</b>

(The longest time this system was in operation, except for tests, was three hours out of twenty-four, never running more than one hour at a time, which kept the house comfortably cooled.)

## A Rational Heat Gain Method

(Continued from page 41)

together with transmission coefficients for walls of various types of building construction. Special cases, which arise in connection with rooms under attics and sloping roofs, are covered in Table 2 of this paper.

Careful judgment must be exercised in selecting temperature differences. Thus, the value for outside walls is equal to the difference between the design outdoor temperature and the design indoor temperature, while the temperature difference across inside partitions may be greater or less. For inside partitions, with no unusual sources of heat on the far side, it is justifiable to assume temperature differences from 3 to 5 deg. less than for outside walls, at that time of day when the outdoor temperature is highest. If the partition adjoins a hot kitchen, or similar heated space, it is desirable to assume a temperature difference somewhat greater than for the outside walls.

(To be continued)

## Registers in Cooling

(Continued from page 70)

ancing of the duct system necessary. The damper positions for the two seasons should be very clearly indicated on each damper, in the duct system.

- The required air volume delivery of the fan will probably be different for the two seasons. Provision must be made for an adjustment of the pulley drive on the fan, or an adjustment of the speed of the motor which drives the fan.
- The experience in the Warm-Air Research Residence, and in similar installations where combined cooling and heating have been performed with a forced-air system, indicates that acceptable conditions can be maintained throughout the year with a single register location.



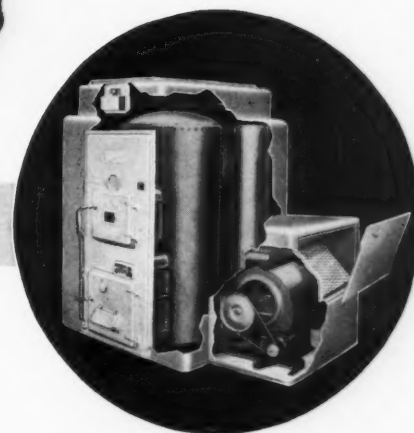
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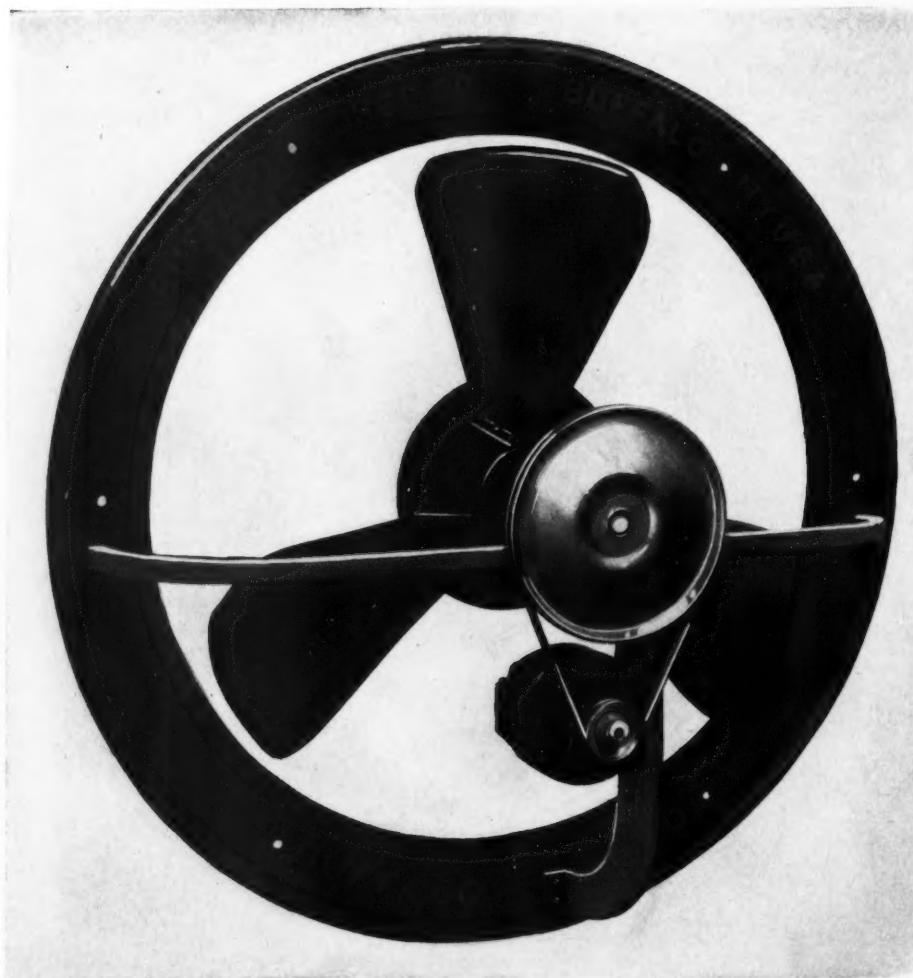
Here is the latest Weir contribution for the great majority market of those who burn solid fuel—either hand or stoker fired. Acclaimed "a hit" at the Shows, not only because its style will grace the appearance of the most modern basement, but because it opens up new possibilities for the Dealer. The fact that "It's a WEIR!" tells much; complete details upon request.

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Here's a new Fan for "Attic Cooling"—a quiet, high-efficiency, LOW PRICE fan which you can sell at a nice profit in dozens of homes in your locality.

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**3**  
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**BREEZ-AIR Fans**

# The Minneapolis Heating, Ventilating and Air Conditioning Ordinance [Part 7]

## Oil Burner Installation

### Part XIV

**Section 1416 Valves:** Readily accessible shut-off valves of approved type shall be installed in oil supply lines near each burner and close to gravity and pressure supply tanks. Shut-off valves of approval type shall be installed on each side of oil strainers which are not a part of the oil burner unit and on the discharge and suction side of oil pumps which pump directly to the burner but which are not a part of the burner unit.

**1416.1** Where a shut-off valve is installed in the discharge line of an oil pump, an approved pressure relief valve shall be connected into the discharge line between the pump and the shut-off valve and arranged to return surplus oil to the storage tank or to by-pass it around the pump.

**1416.2** Control valves shall be provided with stuffing box of liberal size, containing a removable cupped gland designed to compress the packing against the valve stem and arranged so as to facilitate removal. Valves shall be designed to close against the supply, and to prevent withdrawal of stem by continued operation of the handwheel. Packing affected by the oil or by heat shall not be used.

**Section 1417 Preheating of oil,** where necessary, shall be done by steam, hot water or approved electric heaters. Heaters shall be substantially constructed with all joints made oil tight. Thermometers shall be installed at suitable locations to indicate the temperature of the heated oil. Heaters shall be by-passed or provided with suitable means to prevent abnormal pressure.

**Section 1418 Tests of Covered Tanks and Piping:** After installation and before being covered tanks of 1,000 gallons capacity or more, and piping, shall be tested hydrostatically, or with equivalent air pressure, at a pressure not less than  $1\frac{1}{2}$  times the maximum working pressure but not less than 5 pounds per square inch at the highest point of the system. Instead of a pressure test, suction lines may be tested under a vacuum of not less than 20 inches of mercury. Such tests shall be made by the installer, in the presence of the inspector, and

shall continue for at least 30 minutes without a noticeable drop in pressure or vacuum.

**Section 1419 Oil Burner Controls:** Oil burner equipments shall be provided with some means for manually stopping the flow of oil to the burner, from a conveniently located point at a safe distance from the burner. With electrically driven equipment this may be accomplished by a switch in the motor supply circuit, placed near the entrance to the room where the burner is located. A quick-closing valve in the oil supply line may also be used.

**1419.1** Automatically operated oil burners used in connection with vapor, hot water, steam or warm air heating systems shall be equipped with approved automatic devices to shut down the burner in the event of undue pressure in a steam boiler or overheating within a hot water boiler or warm air furnace.

**1419.2** In systems where steam or air is used for atomizing the oil, the equipment shall be so arranged that in case of interruption of the atomizing supply, the oil supply will be immediately shut off.

**Section 1420 Electric Wiring and Equipment:** In connection with oil burner equipments shall be installed in accordance with the provisions of "An Ordinance Regulating the Installation, Operation and Maintenance of Electric Wires, Apparatus and Plants within the City of Minneapolis," approved April 1, 1922.

**Section 1421 Installation of the Burner:** Oil burners shall be securely installed in a workmanlike manner, in accordance with the instructions of the manufacturer, by qualified mechanics experienced in making such installations.

**1421.1** Where oil burners are installed in furnaces originally designed for solid fuel, the ash door of the furnace shall be removed or bottom ventilation otherwise provided to prevent the accumulation of vapors in the ash pit, unless the burner is of a type which mechanically purges the ash pit.

**1421.2** Boilers and furnaces in which oil burners are installed shall be connected to flues having sufficient draft at all times to assure safe oper-

ation of the burner. Smoke pipe dampers, if any, shall be removed or locked in the desired position and shall be such that they cannot close off more than 80 per cent of the internal cross section area of the smoke pipe. All check drafts must be kept closed at all times.

**1421.3** Rooms in which oil burners are located shall be provided with adequate ventilation to assure continuous complete combustion of the oil.

**1421.4** Complete instructions for the care and operation of the oil burner equipment shall be conspicuously posted near the oil burner and shall be maintained in readable condition by user, and there shall be displayed, near the heating plant, a card which shall read as follows:

Notice. The Minneapolis Ordinance requires that pipe dampers shall be removed or locked in the desired position and no damper closing off more than 80% of the pipe area shall be allowed. All check drafts must be kept closed at all times.

**1421.5** Contractors installing industrial oil burner systems shall furnish diagrams showing the main oil lines and controlling valves, one of which shall be posted near the oil burner equipment and another at some point which will be accessible in case of fire at the burners.

**Section 1422 Modifications:** Where the circumstances or conditions of any particular installation are unusual and such as to render the strict application of the provisions of Part XIV of this ordinance impracticable, the Department of Buildings may permit such modifications as will provide a substantially equivalent degree of safety.

**Section 1423 Fireproofing, When:** It shall hereafter be the duty of each licensed oil burner installer, when installing an oil burner in connection with a heating plant, to install such fireproofing, adjacent to the smoke pipe thereof, as may be required to comply with the following provisions:

(a) No metal smoke pipe shall pass through any floor or be nearer than 12 inches to any wood or other combustible portion of the building except as noted below and all combustible material within eighteen (18) inches shall be covered with a metal or asbestos shield extending at least one foot on each side of the smoke pipe  
(Continued on page 100)





# ASSOCIATION ACTIVITIES

## Roofing Conference

In accordance with the decision of the 1935 Cincinnati meeting of the Roofing and Sheet Metal Industries Conference, the 1936 meeting was held at the Traymore Hotel, Atlantic City on March 2 and 3, 1936. Some twenty members of the industry from New England, Southeastern and the Middle Atlantic areas met with representatives of the manufacturers, and devoted two days to an informal discussion of the many problems of the industry.

The small attendance was interpreted as evidence of the sorely depressed condition of the industry and indication of the need for a co-operative movement in the different branches of the industry towards improving conditions. A recent survey showed that only a score or two of contractors did work in more than one metropolitan trade area in the northeastern section thus interest is mainly local among contractors. It was reported that except for two New England groups, most of the existing trade organizations, both regional and national, were practically bankrupted by the expenses incurred under the NRA Code, and that interest in Trade Association activities has been at a very low ebb since that time. It was agreed that the renewal of this interest must start with a revival of local cooperative efforts, which might eventuate in a recognized need and demand for national organization service. The efforts in this direction of American Brass Co., American Rolling Mill Co., Barber Asphalt Co., Barrett Co., Johns Manville Co., and Republic Steel Co. to bring together groups of their customers were commended.

It was demonstrated that many of the evils could be solved if manufacturers gave more cooperation to the contractors of the industry. California, Northeastern and Canadian groups have done well. Most of the others have suffered from trying to function on too low dues and failing to collect from a sufficient number of contractors.

At the closing session, the following platform was adopted:

(1) In view of the apparent lack of general information as to the vital contribution of the Roofing & Sheet Metal Industry to the health, comfort

and safety of the public through its various branches, there is an obligation on each branch of the industry, to do its part towards educating the public to the importance of our work and towards elevating its standards and dignifying its standing.

(2) Before there can be an effective national organization there must be local and regional development.

(3) This local cooperative effort can be aided and stimulated by:

- (a) Trade papers.
- (b) Associations — National, state and local.
- (c) Manufacturers.
- (d) Wholesalers.
- (e) Labor organizations.
- (f) Service clubs.
- (g) Government agencies.
- (h) Hotel and convention bureaus.
- (i) Individuals with a community interest and altruistic spirit imbued with Theodore Roosevelt's creed. "Every man owes some of his time and money to the upbuilding of his trade or profession."

(4) The first objective is to assist and stimulate this cooperative effort in those localities and sections where no organizations are now active, and to arouse renewed interest and activity in existing trade organizations.

(5) As other definite objectives:

(a) Inaugurate safety work and campaign to reduce compensation insurance costs.

(b) Adopt "Firm Bid" price policy.

(c) Join with other construction interests to eliminate government competition in industry.

(d) Cooperate with manufacturers and others in national advertising and sales promotion.

(e) Encourage the licensing of properly qualified contractors for the protection of public interest.

(f) Sponsor quality work.

(g) Establish that furnishing roof drains should always be included in roofing and water-proofing contracts.

(h) Encourage honesty in use of materials as specified.

(i) Overcome inferiority complex of contractors.

(j) Secure trade schools for training skilled mechanics.

(k) Have standard code for warm air heating installations made mandatory in every city.

(l) Adopt plans looking toward the elimination of unfair competition of those manufacturers, wholesalers and mail-order houses who engage as contractors in one or more branches of this industry as a side-line, using their greater resources and purchasing power to the disadvantage of bona-fide members of the industry.

Warner S. Hays,  
Chairman.

## New York City

The Employers' Association of Roofers and Sheet Metal Workers of Greater New York, Inc., recognizing its obligation to the roofing and sheet metal industry, is inaugurating a series of educational conventions in order to present to the members of the industry discourses on the various products and methods of manufacture and erection or application.

At these conventions it is intended to offer opportunities to the numerous producers of the materials used by members of the industry to present explanatory talks—possibly illustrated—relative to their respective products.

These talks should enable the members of the industry to keep up-to-date on all materials that may be introduced for their use.

Opportunities will also be offered for talks on modern business practices; insurance problems and any other items that may help to solve the problems that confront every roofing and sheet metal contractor.

It is hoped that these conventions will also bring about a fraternal feeling among those engaged in the industry.

The first of these conventions was held at 2 Park Ave., New York City, on Thursday, May 7, 1936, 7 P. M. The convention was sponsored by the Insulite Co., 101 Park Ave., New York, manufacturers of insulation materials, asphalted roof insulation, etc., who provided a dinner which preceded an illustrated talk on the product they manufacture and which is extensively used by roofing and sheet metal contractors.

There was no solicitation either for membership in this Association, or for the product talked about.

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For valleys, gutters, rain-pipes and flashings, no metal serves as long, as dependably, or for as little money as *Anaconda Copper*. *Anaconda 85 Red-Brass Pipe* is the highest quality water pipe commercially obtainable. *Anaconda Copper Tubes*, installed with *Anaconda Solder Fittings*, cost about the same as rustable pipe. *Everdur Metal for Tanks*... rustless as copper and strong as steel... assures clean hot water indefinitely and ends all water storage tank expense due to rust.

Wide, thin sheets of *Anaconda "Electro-Sheet" Copper*, combined with alternate layers of asphalt, make a more durable type of built up roof. Also used to damp-proof walls and foundations. Screens of rustless *Anaconda Bronze Wire* last indefinitely.

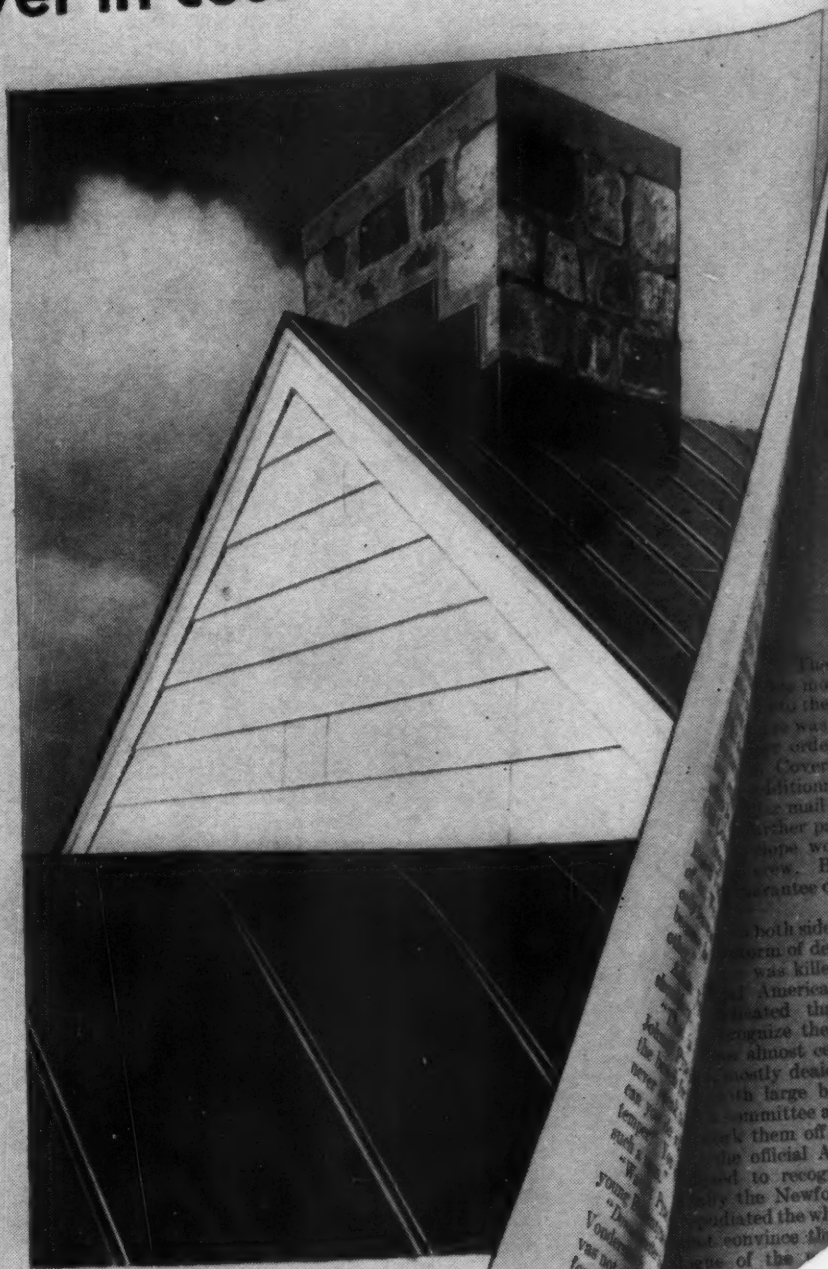
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and in COLLIER'S, issue of MAY 30<sup>TH</sup>



## Association Activities . . .

### N. W. A. H. & A. C. Meeting

The Mid-Year meeting of the National Warm Air Heating and Air Conditioning Association is to be held June 17 and 18, 1936, at the Deshler-Wallick Hotel, Columbus, Ohio. The Committee on Arrangements states that among the subjects to be discussed by outstanding speakers are, forced air in its various phases, selling, profitable air conditioning, including a resume of the research work in that subject and something special as to the oil burning furnace. Quite a little time will also be devoted to the important subject of automatic controls.

A new feature at this particular meeting will be a special noon luncheon to be served in the Deshler-Wallick immediately following adjournment of the Wednesday morning, June 17, convention session. There will be only one speaker and his talk will be in lighter vein.

The afternoon of Thursday, June 18, is to be occupied by a Golf Tournament with prizes. This will be open to all. Perl S. Miller and L. R. Taylor are in charge.

Formal Announcement and Program will be distributed in advance. Allen W. Williams—50 West Broad Street, Columbus, Ohio—managing director of the association is in charge of the Convention.

### Philadelphia

The Hardware Merchants' and Manufacturers' Association of Philadelphia is this year celebrating the completion of fifty years of active and successful association cooperation. An interesting brochure listing the highlights of fifty years has been published in commemoration. Some of the outstanding accomplishments of the group, the competitive problems, welding of individual effort into group activity, reciprocal activity, together with a resume of the slow, but sure, progress of the organization, the sacrifices of officers and members, the basic purposes of the group and how the organization operates make interesting reading.

### Columbus, O.

All of our officers and directors of last year were reelected to serve another year. They are Harry B. Snyder, president; F. G. Mirick, secretary-treasurer. Directors, A. E. Bogen, H. Clyde Scott, Stanley Allen.

We have a very comprehensive program for the coming year. We believe that it pays to keep the life blood of the association flowing and that this can best be done by keeping up the attendance. We want members to get in the habit of constant attendance whether or not there are measures of

immediate vital importance to consider. We feel that such measures can best be handled when they do come up by a live association of members who are acquainted and accustomed to working together, if not on business matters, at least on social affairs.

For this reason, our program consists of business meetings and social affairs on alternate months. And even the business meetings are conducted more on the plan of the noonday service clubs with a good dinner and speaker provided for each meeting. Following is our program for the year.

April 15—Pot luck dinner and card party.

May 20—Meeting 6:30 p. m. Chittenden Hotel. Dinner and speaker.

June 17—Picnic.

July—Nothing.

August—Nothing.

Sept. 16—Meeting 6:30 p. m. Chittenden Hotel. Dinner and speaker.

Oct. 21—Dance.

Nov. 18—Meeting 6:30 p. m. Chittenden Hotel. Dinner and speaker.

Dec. 16—Pot luck dinner and card party.

H. B. Snyder, President.

### Pittsburgh

The Pittsburgh Retail Hardware Association, of which W. E. Whitehead is secretary, joined the paint distributors in a clean up, paint up meeting and dinner on April 24 at the Fort Pitt Hotel. Theodore E. Damm, Washington, D. C., spoke on "Time Payment Plan; Clean Up and Paint Up Campaign; Merchandising Paint." Hardware dealers and their clerks attended with the idea of learning how to get their share of the paint business. Door prizes were given.

### Milwaukee, Wis.

The Master Sheet Metal, Heating, Ventilating and Air Conditioning Contractors Association of Milwaukee, Wisconsin, is the name of the new association. Officers are: President, R. H. Fetting; vice president, E. F. Arndt; secretary, H. H. Peters, treasurer, A. C. Goethel; executive secretary, Paul L. Biersach; Building Congress Committee, Paul L. Biersach and Walter A. Belau; Legislative Committee, H. H. Peters, Rudolph Biersach and Joe G. Bauer; Educational Committee, Wm. Pietsch, Walter Marth and H. W. McDowell; Trade Relations and Policy Committee, A. C. Mantei, E. F. Arndt, Oscar Hoffman and Art Podolske; Membership Committee, John Goodwin, E. F. Arndt and Al. Walters; Entertainment Committee, Walter Arndt, Frank Kramer and Louis Stefanik.

The new association, which is a

combination of the old Wisconsin Sheet Metal and Roofing Contractor's organization and the newer Furnace and Air-Conditioning Association, will hold regular meetings on the first Monday of each month at eight o'clock, Builders Exchange Building.

The first major activity of the association is to be a ten-lesson school on mechanical heating and air conditioning, conducted by F. E. Herman of the Furblo Company. The first meeting was held Friday, February 14 in the Republican Hotel. These schools will be free without any tuition or charges, and the association is inviting all contractors from the Milwaukee area to participate in the meetings, whether or not they are members of the association. Seventy-eight members of the association and of the industry attended the first meeting on February 14. The association hopes to increase attendance to 150 interested contractors. Full information on the course and the association can be obtained from the secretary's office.

Paul L. Biersach,  
Secretary.

### Stoker Manufacturers' Convention

The 1936 annual meeting of the Stoker Manufacturers' Association will be held at the Greenbrier Inn, White Sulphur Springs, West Virginia, on June 11, 12 and 13, President J. R. Whitehead announced on May 1.

The members of the Association will consider plans concerning a stoker research program in cooperation with the bituminous coal industry through Bituminous Coal Research, Inc. A thorough study will also be made of certain recommendations which will be presented by the Association's Engineering Committee regarding studies and investigations made during the past year on such subjects as standardization of stoker ratings, boiler setting heights, furnace dimensions and other related items.

### National Warm Air

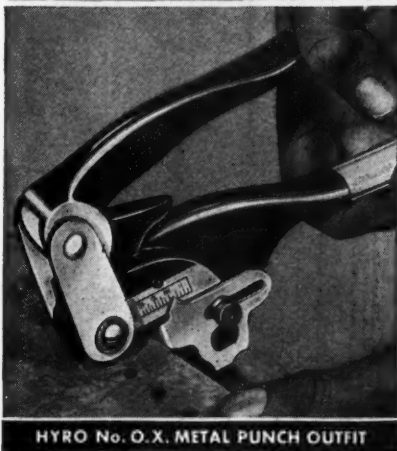
The Research Advisory Committee of the National Warm Air Heating and Air Conditioning Association at its meeting held during the annual convention in January suggested that during the summer of 1936, an investigation on cooling using city water be continued covering a range of water temperatures lower than the 58 degrees used in 1935. Cooling will be done by means of fin tube cooling coils as during 1935. The committee suggest that water temperatures of 52 and 45 degrees be investigated. Furthermore, the committee suggests that the amount of cooling service to be used during 1936 should be reduced to accommodate the decrease in water temperatures.





## "They suit me to a 'T'"

*There's a Good Reason*—sheet metal workers prefer these Parker-Kalon Products because they were specially designed for the work, by men who have been sheet metal workers themselves. Look them over . . . see the "fine points," the advantages which show that these products were made by practical men, who *know* sheet metal work from A to Izzard.



HYRO No. O.X. METAL PUNCH OUTFIT

### More Powerful —More Convenient

Only 8 inches over all, yet this famous tool will punch a  $\frac{1}{4}$ " hole in 14 gauge metal. So strongly made it lasts for years. No other punch its size can equal it for power and strength. Has many convenience features, including a front pointer and side gauge combination, a deep throat, etc. The Punch comes in a sturdy steel carrying case with a set of 7 punches and 7 dies . . . a real value for only \$5.90 (F.O.B. N.Y.). Ask your jobber or write us for folder which gives complete details.



HYRO UNXLD DAMPER QUADRANT SET

### Complete Damper Control Set in one time-saving box

When you buy the famous Hyro Damper Controls you save the time and bother of getting together a lot of different parts. *Everything* needed for a damper control installation is packed in a single box. In one set you get an UNXLD Damper Quadrant, widely known as the "standard" of control devices. The other contains the inexpensive but efficient Hyro Dial Damper Regulator. Both include all necessary Damper Bearings; and the rivets and Parker-Kalon Sheet Metal Screws for attaching parts. If your jobber does not carry these sets, write us.



HYRO SHUR-GRIP SOLDER IRON HANDLE

### Screws on and Stays on —Keeps Cool

A few pennies extra buys this handle that almost makes soldering a pleasure. No need to burn it on. You screw a Shur-Grip on the iron stem like a nut on a bolt . . . a unique die locked in the handle cuts a thread on the stem as it is screwed on. Once on, it **STAYS ON** until you unscrew it. Because of a vent hole through the handle, and the fact that the iron stem does not touch the wood, a Shur-Grip is comfortable and economical to use. It will not "burn-up" like a common handle. Try this better handle. It comes in three sizes to fit irons from  $1\frac{1}{2}$  to 12 lbs.

Products of  
**PARKER-KALON CORPORATION**

190 Varick Street, New York, N. Y.

For your convenience a number has been assigned each item. Check the items in which you are interested on the coupon on page 99 and mail to us. Complete information will be forwarded.

● Indicates product not listed in 1936 Directory

△ Indicates product and manufacturer not listed in 1936 Directory

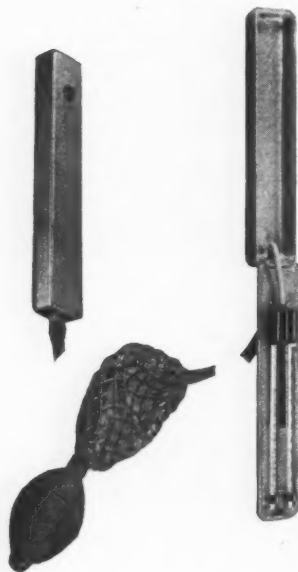
# NEW PRODUCTS

## 31—New Steel

The Inland Steel Company, Chicago, announce a new steel—Hi-Steel. It is of the so-called low alloy, high tensile strength class, and its characteristics promise that it will prove to be one of the best steels of this group. The minimum yield point is 60,000 lbs. per sq. in. for gages lighter than  $\frac{1}{4}$ " and 55,000 lbs. in heavy gages. Minimum ultimate tensile strength is 70,000 lbs. per sq. in. giving it a high elastic ratio. The elements used give this alloy a high degree of uniformity and physical characteristics as well as workability. Tests extending over a year's time show that it will bend, form, stamp, seam, and weld readily. It is highly resistant to corrosion. It will be supplied as sheets, strips, plates, bars and structurals.

## 32—Psychrometer

Julien P. Friez & Sons, Inc., Baltimore, Maryland, announce a new hand aspirated psychrometer consisting of a pair of matched thermometers, arranged so that necessary aspiration over the bulbs is induced by a steady jet of air applied by a hand pump. The pump consists of a bulb protected against over-inflation by a net covering. The reservoir evens out the im-



pulses of hand pumping and provides a steady supply of air to the nozzle. Secondary air is drawn into the vent through a tube through an opening in the chamber which surrounds the wet and dry bulbs. The cover of the chamber is opened to apply water to the wet bulb wick. The handle of the instrument forms the case and when not in use, the thermometers and mechanism portion slide inside the handle. The rubber bulbs and tube are disconnected and rolled around the handle for carrying. The instrument is said to do away with the necessity for whirling a psychrometer in view of the customer. The operation of the instrument is also said to eliminate much of the error in the use of ordinary psychrometers in the hands of unskilled operators.

## 33—Stoker

The Iron Fireman Coal Flow, a new residential bin-feed automatic coal burner, has just been introduced by



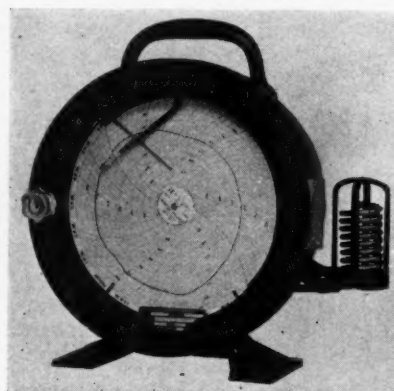
the Iron Fireman Manufacturing Co., Portland, Cleveland and Toronto.

The new stoker has the operating mechanism housing either behind or beside the furnace. This leaves unobstructed floor space between bin and furnace.

A feature is the design of the retort section. Because the transmission is on the opposite side from the bin, the center shaft of the conveying screw continues through the retort. The conveying screw ends after it enters the retort, while on the side opposite the coal entrance a reverse flight is mounted on the shaft. The reverse flight prevents the coal from flowing out of the retort. The two opposed flights unite in forcing the coal upward into the fire.

## 34—Portable Thermometer

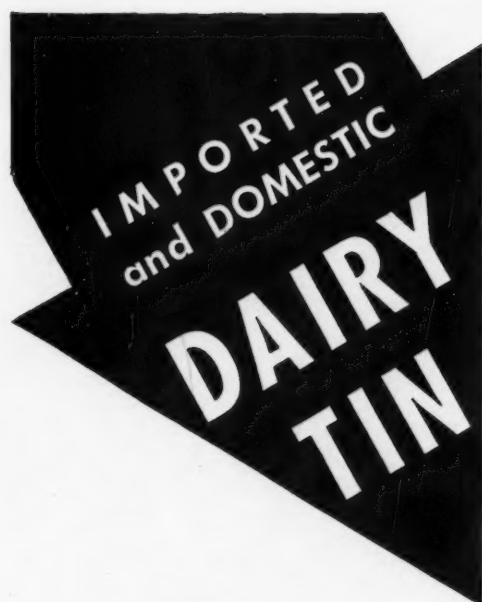
The Brown Instrument Company, Wayne Junction, Philadelphia, announces a new type of recording thermometer with the sensitive element or bulb located outside of the instrument



where it will respond rapidly to changes in the surrounding temperature. The unit is portable and is built to withstand rough handling in the field. The case is die-cast aluminum with a completely gasketed door that is moisture proof. Readings are reproduced on an 8-inch 24-hour chart. The outside mounted bulb is filled with mercury and the outside mounting is said to do away with the influence of large masses of metal where the bulb is mounted within the cabinet.

## 35—Oxy-Acetylene Cutting Attachment

Oxweld Type CW-22, oxy-acetylene cutting attachment has been announced by The Linde Air Products Company, 30 East 42nd Street, New York, N. Y. This new cutting attachment will handle light sheet metal as well as all but the heaviest work at speeds and efficiency equal to those of the full size cutting blowpipe. The attachment operates on low-pressure or medium-pressure acetylene. Sturdy, smooth operation at all times and all pressures is given by the new streamline injector and improved type cutting valve, with removable seat, centralized under the cutting lever. The mixed gas passage is formed by three Ambrac tubes. The length, and four 90-deg. changes of direction, afforded by this type of construction give exceptional flashback resistance.



Prime Metal Sheets  
Eaves Trough, Gutter, etc.  
Roofing, Paint, Supplies  
Sheet Metal Tools  
Warm Air Furnaces  
Winter Air Conditioning  
Systems

## "COOKLEY K" PRIMES

Because it is world renowned for quality and uniformity of coating, OSBORN has stocked Cookley K Prime tin plate for many years. During this time, these sheets have given complete satisfaction. It, as well as domestic tin plate, is carried in stock in the sizes shown. Prompt attention will be given to your inquiries.

### COOKLEY K PRIMES, IN STOCK

4X	(25 gauge)	36 x 72—17	lbs. per sheet
D4X	(22 gauge)	36 x 84—28½	lbs. per sheet
D4X	(22 gauge)	36 x 96—32½	lbs. per sheet
D4X	(22 gauge)	48 x 96—43	lbs. per sheet
	18 gauge—	36 x 96—50	lbs. per sheet

### EXCELLO CHARCOAL BRIGHT 6A GRADE DOMESTIC

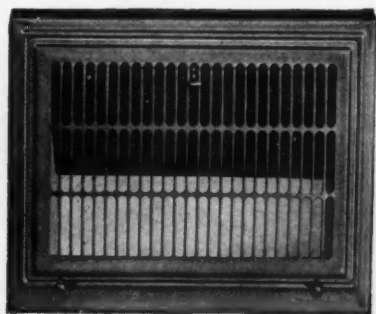
24 gauge—	36 x 60—15	lbs. per sheet
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(Sheet Weights are Approximate)

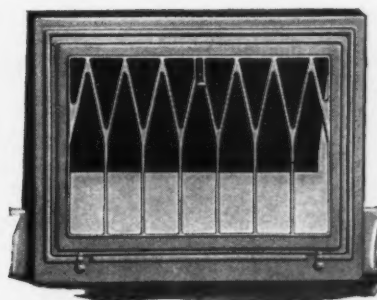
**"A DEPENDABLE SOURCE OF SUPPLY"**



## Registers That Bring Out the Best in Any Heating System!



No. 800—ELITE (face removable without tools).  
▶ Ask for Catalog 36, showing complete line of Auer Registers and Grilles for heating and air conditioning.



No. 800—WINNER (positive valve Adjustment).

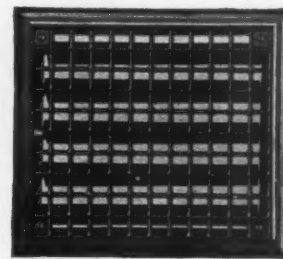


Fig. 0—Reinforced All Steel Floor Register—will not warp, sag or break.

THE AUER REGISTER COMPANY, 3608 PAYNE AVENUE, CLEVELAND, OHIO

**AUER** DISTINCTIVE **REGISTERS**  
& GRILLES  For Air Conditioning and Gravity



# New Products . . . . .

## 36—Attic Cooling Fan

Breez-Air is the name of a new propeller fan by the Buffalo Forge Company, Buffalo, designed especially for attic cooling.

Best results, they say, are achieved by providing an opening so the air can be drawn from the hall on the top floor of the residence, using a connection between the unit and the attic floor. The fan pulls the hot air from the rooms below, and discharges it into the attic. This warm air is then forced outside through suitable openings, usually through attic windows or grills, which should have an area of not less than 10 square feet for best results. At the same time, fresh air is drawn into the home. This forced air circulation through the rooms removes the heat stored up during the day in the walls, roof and ceiling and promotes a cool, refreshing breeze throughout the house.

The Buffalo Breez-Air is manufactured in three sizes—30, 36 and 42 inch—and may be installed with either a wood or steel mounting box. The 30-in. size is recommended for the average home, and is said to have capacity to give an air change once every two and a half minutes in the average home—24 air changes each hour. Bulletin 3010 contains complete description.

## 37—High-Tensile Sheet

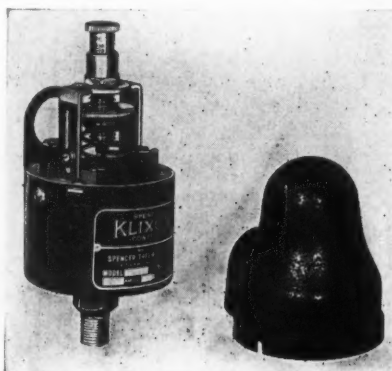
The American Rolling Mill Company, Middletown, Ohio, announces Armco H. T.-50, a special high-tensile steel in sheet or plate, possessing an impact tensile strength of 5,000 foot pounds per square inch, and designed for special uses requiring high stress, yet possessing sufficient ductility to be



adaptable for various fabrications. The endurance limit of H. T.-50 is 48,000 pounds per square inch and the yield point is 47,000 pounds per square inch, in hot rolled grades. Tensile strength is 67,000 pounds per square inch in hot rolled grades and 70,000 pounds per square inch in cold rolled grade. Corrosion resistance is said to be four to six times that of ordinary steels and plates will be offered in 20 gage or heavier in all finishes and sizes. The material can readily be welded.

## 38—Pressure Switch

A new pressure switch to be sold under the name "Klixon" is announced by Spencer Thermostat Company, Attleboro, Massachusetts. While the switch is designed primarily as a control of pressure on steam heating boilers, it can be used as a limiting



device for all types of automatic firing equipment fired by oil, gas, coal or coke. The switches are snap-acting, operated by pressure, and are adjustable both to a cut-in setting and to act as a differential. Motion resulting from pressure exerted on the bellows is transmitted directly to the disc which actuates the contacts with a positive snap-action. Bellows, disc and contacts are enclosed and protected by the bot-

## 39—Lock Nut

A new quick-type lock for bolts is announced by The Philip Carey Mfg. Company, Specialty Division, 400 N. Michigan Ave., Chicago. The clip is made of high carbon spring steel with a guide lip bent 90 degrees so that the bolt may be pushed into the socket and held. Where an extra tight lock is desired, the bolt may be given a turn or two whereat the tongue groove cuts itself into the bolt, holding it permanently.

## 40—New Electrode

A new phosphor bronze arc welding electrode has just been announced by The Lincoln Electric Company, Cleveland, Ohio.

"Aerisweld," as the new electrode is called, for welding of bronze, brass and copper, provides a solid homogeneous deposit having characteristics of true phosphor bronze with high tensile strength.

A few of the many applications for "Aerisweld" include: busbars, large contacts, impeller blades, ornamental bronze, bronze doors and galvanized sheets where minimum disturbance of the galvanizing is essential.

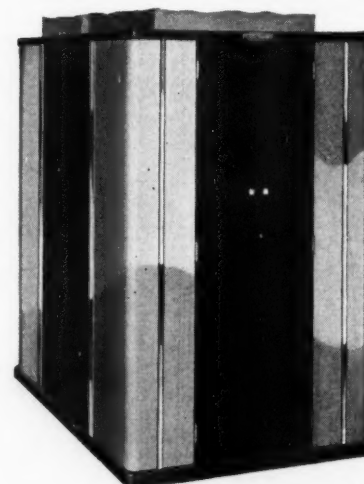
"Aerisweld" is a shielded arc electrode, for use with the metallic arc. Its coating, as it burns, produces a

gas which shields the molten metal from harmful effects of the atmosphere and assists in easing the flow of molten metal in the arc. A welding current of positive polarity is employed. Preheating of the parts is unnecessary when welding any ferrous metal and the lighter grades of copper and bronze. For heavy bronze or copper some preheating may be desirable due to the high heat conductivity of these metals. In such cases, preheating is easily accomplished by using a carbon electrode with the negative polarity and rapidly moving the arc over the area to be welded.

## 41—Oil Burning Furnace

Perfection Stove Company, Cleveland, Ohio, announces their new Superfex Oil Burning Air Conditioning Heating Plant using inexpensive domestic fuel oil, to clean, humidify, warm and circulate air every minute of the winter day.

A twelve-page booklet illustrates and describes the Superfex designed for



health, comfort, convenience, cleanliness, and dependability. The importance of air conditioning is stressed.

The Superfex is manufactured in six models in heating capacities of 53,000, 85,000 and 140,000 B. t. u. per hour. All models are styled by a well known designer and may be had in a variety of finishes and colors. All furnaces employ a continuous flame with the size of flame controlled by the room thermostat through an electric valve. High-low flame and speed of blower are selected to fit each installation.

## 42—Insulating Kit

Mineral Felt Co., State Life Building, Indianapolis, Ind., announces the Minfelt Kit containing fabricated rock wool blocks, paste, canvas, and metal strips, completely packed in a single carton. The different kits may be selected for hot water tanks, furnaces, boilers, or pipes. An illustrated folder and a price list may be secured on application.

*They're* **RINGING**  
*the* **BELL**  
*and* **HOW!**



**H & C**  
**No. 210**  
FLOOR  
REGISTER

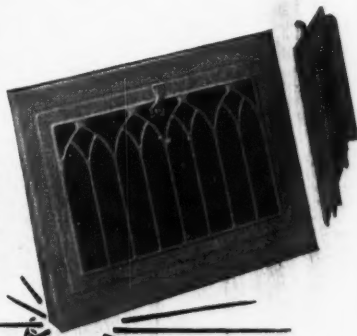
Standard mesh 7/16" x 1-7/16". Face is removable from body. Exceptionally rigid. Large air capacity. Precision built throughout.

Month after month these two H&C registers continue to pile up sales records at a truly amazing rate. Why? There's just one logical answer. These registers are outstanding — superior appearance, construction, finish and workmanship; and the big majority of progressive installers who know that it pays to handle the best registers available are going for them in a big way.

Don't miss a good bet. Inspect these registers at your H&C Jobber at the earliest opportunity.

**H & C**  
**No. 120**  
BASEBOARD  
REGISTER

Combines the unmatched beauty of H&C No. 110 Series Baseboard Registers with a construction which permits lapping the stackhead over the frame.

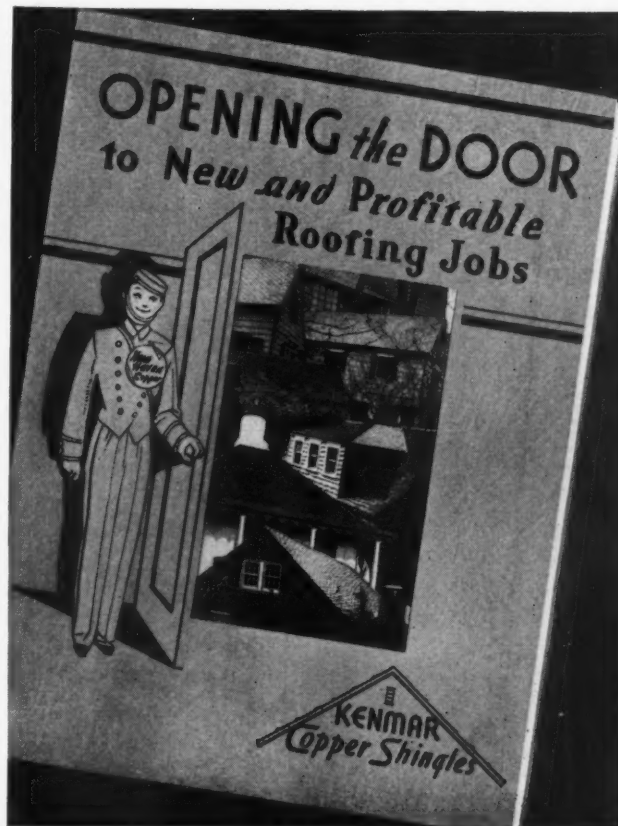


**WHAM!**

**HART & COOLEY MANUFACTURING CO.**

Warm Air Registers  
Regulator Sets **H & C** Air Conditioning Grilles  
Dampers • Chain  
61 W. KINZIE ST. • CHICAGO • ILLINOIS

In Canada: Fort Erie N., Ontario



## Write today for *this much-talked-about* **SALES PORTFOLIO**

Tells you all about Copper Roofs with Kenmar Shingles — the better roof for America's better homes. What's more, it tells you how to get in on the profitable new business we are creating for modern metal roofs.

### **KENMAR COPPER SHINGLES**

are creating a stir in the building field. They put metal out in front as a roofing material. Copper is now practical and architecturally beautiful on *any* pitched roof. The portfolio explains fully—shows why sheet metal organizations can now make real profits on roofing and reroofing jobs. *Get in on this new market.* Write for your free copy of the sales portfolio.

*The New Haven Copper Co.*

MANUFACTURERS OF SHEET COPPER SINCE 1849

*Seymour, Conn.*

*How Much Can  
YOU Save  
With*



**STANLEY  
UNISHEARS?**



You save time, because you can cut sheets up to 15 feet a minute *on the job*. You save labor, because the Unishears do the work faster and better and leave clean, finished edges.

Sheet materials can be taken to the job uncut or cut to rough dimensions. Actual fitting and trimming can be done on the job. Run from any light socket.

Follow Straight or Curved Lines. Ten Portable and Stationary Models—capacities 18 Gauge Hot Rolled Iron to  $\frac{1}{4}$ " Boiler Plate. Save money . . . we'll prove it with a demonstration.

#### CUT ANY OF THESE MATERIALS

Galvanized Iron	Aluminum	Wire Lath
Brass	Stainless Steel	Hardware Cloth
Copper	Armco Iron	Screen Wire
Tin	Fibre	Black Iron
	Blue Annealed Sheets	

**STANLEY ELECTRIC TOOL DIVISION**

The Stanley Works  New Britain, Conn.

## News Items . . . . .

### Opens New Shop

B. J. Malone, long experienced in the sheet metal field has opened his own shop, Malone Sheet Metal Works, 119 Highland Avenue, Jackson, Tenn. Associated will be C. R. Price, also a practical and experienced sheet metal man.

### Report Active 1935

Bluff City Sheet Metal Co., 676 Madison Ave., Memphis, Tenn., one of the active east side firms, report a busy 1935 season. The firm further reports good returns from a modernized show room.

### Patents Revolving Show Case

A crew of sheet metal workers is now engaged in Greenville, Miss., in manufacturing revolving display cabinets, designed and patented by Pete Sarulla, grover on Walthall Street. The Pete Sarullo Cabinet Co. will manufacture the cabinets. Jerome Dawson, a sheet metal man, is associated with the firm. The cabinet has ten compartments and is four feet high.

### Enrollment Increases in A. C. Course

Better employment prospects in the air conditioning industry are reflected by enrollment gains in study courses offered by Massachusetts University Extension, according to Director James A. Moyer.

Twenty-two states, from Florida to California, are represented by men now taking the correspondence course, "Air Conditioning," and class instruction in Massachusetts topped last year's figures. More than 1,200 adult students have enrolled in this new subject to date.

### Kistler's Opens Shop in Burlington, N. C.

Milton L. Kistler announces that he has opened a complete air-conditioning, heating and sheet metal shop under the name Kistler's at Burlington, North Carolina. Mr. Kistler's post office box address is Box 67, and he would like to have manufacturers mail catalogs, prices on heating, sheet metal and ventilating apparatus.

### Modernizing Main Street

A movement to improve the appearance of New Jersey through the modernization of the shopping and business sections of its cities and towns is proving to be a stimulus to many fields of business in that state. Educational and beautifying drives will be held in sixty-seven communities of New Jersey. Dinner meetings were held in forty-two cities (several of the towns combining), on the night of March 31, 1936, to give the movement an auspicious start. Local committees have been formed in the different communities under a state committee with a Federal Housing Administration field representative as chairman.

### Young Regulator Co., Cleveland

The Young Ventilating Company, 4500 Euclid Avenue, Cleveland, Ohio, will hereafter be known as the Young Regulator Company, according to an announcement by E. O. Young.

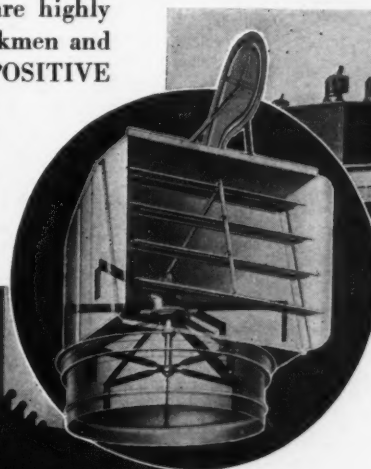
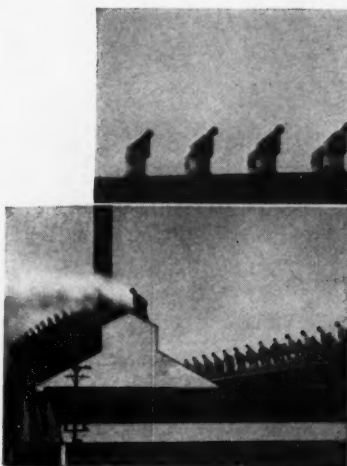
### Warm Air in Cedar Rapids, Iowa

A very interesting report comes from Cedar Rapids, Iowa, stating that in 1934 and 1935 there were 810 heating permits issued. 790 of the installations were warm air systems—only 20 were radiator jobs; 11 radiator jobs one year and 9 the other. Equally interesting is the statement that at least 50 per cent of the warm air installations used mechanical circulation.



# Satisfied Customers Assure FUTURE BUSINESS for You-

Ventilation requirements of today are highly exacting. Health and efficiency of workmen and other building occupants demand **POSITIVE** ventilation—**DEPENDABLE** under all weather and temperature conditions. The amount of air moved should be a *known* factor—backed up by years of proven efficiency.



Can the ventilators you offer your customers definitely meet these requirements? Swartwout Rotary Ventilators **CAN** and **DO**. Their 25 year record of satisfactory performance speaks for itself. They require little "selling" and will build up your goodwill and profits too.

Why not take advantage of their enviable reputation by recommending and installing Swartwout Rotaries this year?

Prices and data on request

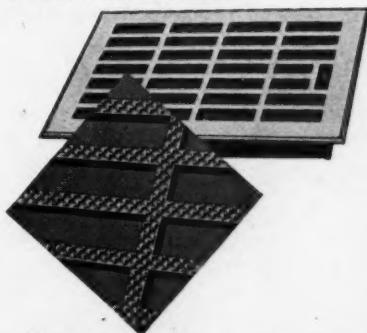
**THE SWARTWOUT COMPANY**  
18615 Euclid Ave., Cleveland, Ohio

**Swartwout Ventilators** ROTARY BRONZE BALL BEARING  
MORE ACTUAL VENTILATION PER DOLLAR INVESTED

## REGISTERS and FACES

*"With An Expression Good To Look At"*

PEERLESS DIAMOND GRID  
COLD AIR FACES

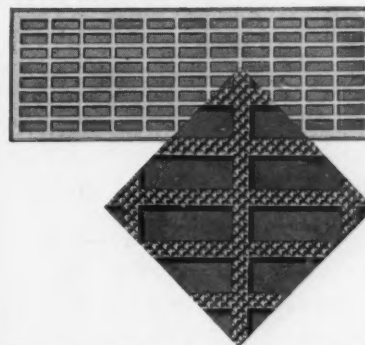


Beautiful in design and finished in lacquer colors to harmonize with interiors. Beveled edges eliminate recessing. Easy to remove for duct cleaning.

PEERLESS  
FURNACE  
FITTINGS

No matter what furnace fitting you may need, from damper clips to casing bonnets, we have them. They are all of the latest type and made of fine materials to meet the demand of the modern furnace dealer. They will fit every type of furnace and give years of satisfactory service. A complete catalogue is at your disposal.

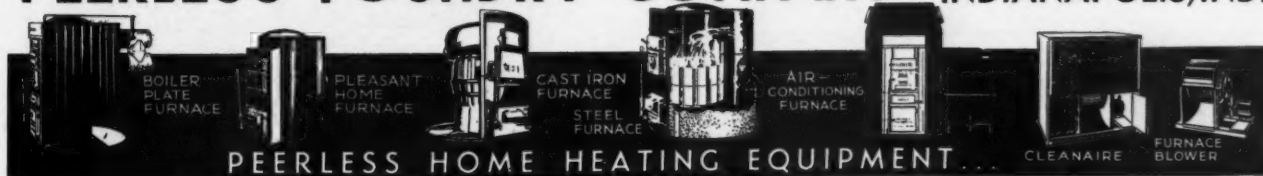
PEERLESS DIAMOND GRID  
FLOOR REGISTERS



They are skid-proof. No bolts mar the appearance of the face or obstruct air flow. The louvers work easily and will not stick. Another "Customer-satisfying" Peerless Product.

WRITE FOR CATALOGUE AND NEW LOW PRICES

**PEERLESS FOUNDRY COMPANY** 1853 LUDLOW AVE.  
INDIANAPOLIS, IND.



# WE *have* EVERYTHING

**A**DMITTEDLY quite a statement to make, but we feel we are in a position to back it up with merchandise, service and quality. You have now at your disposal not only the most complete line of stove, furnace and boiler repair parts to fit all makes, but all warm air heating and air conditioning equipment, from the smallest control right up through, blowers, filters to furnaces.

NORTHWESTERN can supply everything you need to complete a perfect air conditioning installation. Use this convenient source of supply; it will prove to be to your advantage in every way.

**NORTHWESTERN STOVE REPAIR CO.**

662 W. Roosevelt Road  
Chicago, Illinois

## New Literature . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 99.

### 239—Chandler Heating Manual

Chandler Company, Cedar Rapids, Iowa, has prepared a Healthmaster Heating Manual to help the heating contractor plan and figure Chandler Healthmaster heating systems. The endeavor has been to present the contractor with a simple, accurate method of planning and figuring complete jobs. The different steps necessary for both gravity and forced air systems are taken up in four sections—Heat Loss Calculation, Gravity Warm Air Heating System, Forced Air Heating Systems, and Chandler Healthmaster Blowers. Numerous drawings and tables to show short cut methods are presented.

### 240—Register and Fittings Catalog

The Peerless Foundry Company, 1845 Ludlow Avenue, Indianapolis, Indiana, is distributing Catalog No. 36—Peerless Furnace Fittings and Registers—with a dealer discount sheet, effective January 1, 1936, inclosed.

The catalog has been prepared to give the furnace dealer a concise guide for making estimates and for ordering fittings.

### 241—Comfortmaker

The Truth About Air Conditioning is the title of a new booklet copyrighted by Joliet Heating Corporation, Joliet, Illinois. The Joliet Heating Corporation says most people think that air conditioning means cooling the air, but the truth is that heating the air is the most important phase of air conditioning because artificial heat is needed on an average of five to seven months yearly. Proper air conditioning overcomes all the faults of the ordinary heating system—resulting in health, comfort, cleanliness, fuel savings, convenience and increased enjoyment of life.

There is a brief history of heating through the ages, with the various faults of the apparatus and comments on what is expected from air conditioning—health, comfort and fuel saving. Heating units, blowers for the control of air circulation, filters to clean the air, ample moisture provided by the Comfortmaker, automatic electric controls, moving air for health and comfort, and cooling and dehumidifying of air are the seven phases of air conditioning provided by Model A Comfortmaker and described in detail in the booklet. Models E, F, G, and O Comfortmakers are also illustrated and described.

### 242—Metal Roofing Leaflet

A new leaflet showing features of construction and application of Drainrite metal roofing, manufactured by Continental Steel Corporation, Kokomo, Indiana, and distributed by The J. M. and L. A. Osborn Co., is announced. Drawings show the construction of the special water-tight joint, while the text explains all of the points of interest.

### 243—Fabricating Pre-Finished Metals

American Nickeloid Company, Peru, Illinois, manufacturers of bonded metals, has just issued "Fabricating Pre-Finished Metals." The ultimate aim in using pre-finished metals is to avoid finishing operations after forming. Pre-finished metals, however, should be fabricated a little bit differently than the ordinary base metals. There are instructions as to temperature of metal and tools, bending, seaming, soldering, welding, stamping and drawing, proper adjustment of machines and tools. Metallurgical characteristics and how to compensate are discussed.

# SELL ECONOMY !

*—by selling and installing Copper.*

## ● HUSSEY

Sell Economy? Certainly! When you sell HUSSEY Quality Copper you are **selling** economy. Installing copper on a job protects that particular job for **years** against the ravages of wear and deterioration. Copper is the better metal on any job and **always** returns a handsome profit—another reason why you should exert yourself to secure this type of business. "Buying for price" is on the way out and people are again becoming value conscious—your place to step in and sell them on copper—HUSSEY Quality Copper.

The complete HUSSEY organiza-

tion is always at your service and is literally no more than a stone's throw or so away when you need copper products in a hurry.

The entire staff of our thirteen conveniently located sales offices and seven completely stocked warehouses work together to provide the utmost in service to our customers. They have been trained to accommodate every order, whether large or small, in the fastest possible manner.

Use copper on all your metal jobs and to insure prompt delivery and forestall delay be sure to buy HUSSEY Quality Copper.

### DISTRICT SALES OFFICES

BALTIMORE  
BUFFALO  
CHICAGO  
CINCINNATI

CLEVELAND  
DALLAS  
NASHVILLE  
NEW ORLEANS  
NEW YORK

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PITTSBURGH  
ST. LOUIS  
SAN FRANCISCO

### WAREHOUSES

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CINCINNATI

CLEVELAND  
NEW YORK  
PHILADELPHIA

PITTSBURGH  
ST. LOUIS

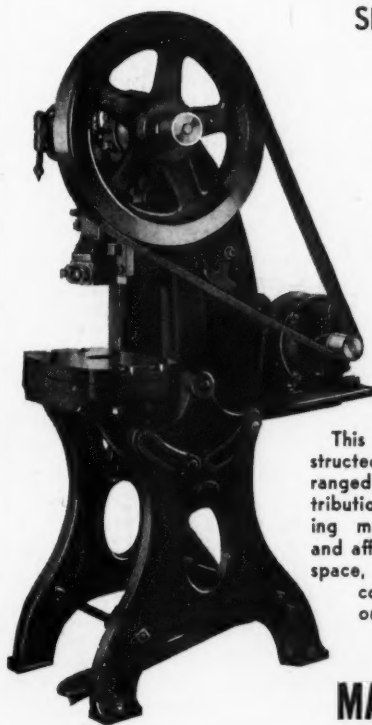
**C. G. HUSSEY & COMPANY**  
PITTSBURGH PENNSYLVANIA

## ● The MARSHALLTOWN Line



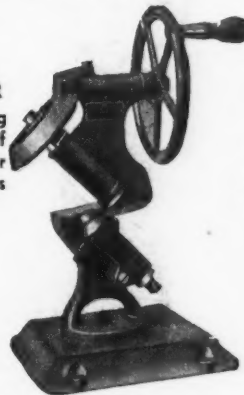
PRESSES—Capacities from 10 ton to 70 ton.

SHEARS—Capacities 18 gauge to 1/2" plate.



No. 2  
PRESS

This ruggedly constructed Press is arranged with proper distribution of weight giving maximum strength and affording ample die space, low operating cost and increased output.

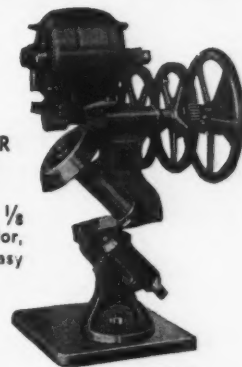


No. 18  
HAND POWER  
THROATLESS SHEAR

For irregular cutting or straight splitting of 18 gauge sheets or lighter. Will cut sheets of any dimensions.

No. 18  
MOTOR POWER  
THROATLESS  
SHEAR

Complete with 1/8 HP standard motor, self-feeding and easy to operate.



No. 116  
THROAT SHEAR  
Is especially designed for Cutting Inside Circles and Irregular Shapes.



Ask Your Jobber or Write

**MARSHALLTOWN MANUFACTURING CO.**  
MARSHALLTOWN IOWA



## WHITNEY LEVER PUNCHES



Length 23". Capacity  $\frac{5}{16}$ " through  $\frac{1}{4}$ " iron, weight 13 lbs., depth of throat  $1\frac{1}{16}$ ". Punches and dies  $\frac{3}{32}$ " to  $\frac{1}{2}$ " by  $\frac{1}{4}$ ".

No. 4-B PUNCH



This punch for sheet metal work has a capacity of  $\frac{1}{4}$ -in. through 16 gauge. Weight 3 lb. Length  $8\frac{1}{2}$ -in. Depth of throat 2-in. Complete tool includes three punches and three dies of specified sizes with die adjusting key.



## CHRISTIE FURNACE VACUUM CLEANER

A One-Man Super-Powered Machine

**\$99<sup>50</sup>**

(Subject to Change Without Notice)

F. O. B. Cincinnati with Tools and Attachments

This is the same high quality machine that is known to furnace dealers everywhere as the most powerful, one-man cleaner on the market. Built by practical furnace men.

Quantity production and large purchasing power enable us to make this sensationally low price. Includes tools and attachments. Folder "A" mailed upon request.

We also manufacture the "Christie Giant" to operate from truck or yard.

Sold by Jobbers and Furnace Manufacturers.

DISTRIBUTORS WANTED: Write for interesting proposition.

**CHRISTIE CLEANER COMPANY**

Division of The Cincinnati Sheet Metal & Roofing Co.

226-30 East Front St.

Cincinnati, Ohio

## New Literature

For your convenience in obtaining copies of new Literature, use the coupon on page 99.

### 244—Production of Sheet and Strip

Fabricators and users of sheet and strip steel get a complete description of modern continuous mill operations in an illustrated booklet, "Our New Continuous Hot Mill and Continuous Cold Reduction Mills," issued by the Youngstown Sheet & Tube Co., Youngstown, O.

### 245—Mushroom Air Diffuser Leaflet

A new catalog, showing the construction features and giving full information on sizes, prices, capacities, together with suggested installation practices for mushroom floor air diffusers, is announced by Knowles Mushroom Ventilator Company, 41 North Moore Street, New York City. The catalog also discusses the down draught system of ventilation for large areas and shows the several types of Knowles mushroom ventilators now manufactured. The catalog also shows the riser, gallery ventilator, double discharge head, aisle hood types of ventilators, accompanied by dimensions, capacities and prices.

### 246—Armco Radio Program

The April issue of Ingot Iron Shop News, published by The American Rolling Mill Company, Middletown, Ohio, mentions the national magazine advertising campaign planned to aid dealer sales. Three radio broadcasts for sheet metal contractors opened the campaign.

### 247—Prefabricated Duct Chart—Second Edition

Lamneck Products, Inc., 416 Dublin Avenue, Columbus, Ohio, has published a second edition of their simplified guide chart, dated March 20th, 1936, and ask that all copies of the previous edition be destroyed.

This guide chart is intended as a handy help to the estimator for quick and easy figuring of standard stock sizes in fittings and duct work for complete installations of forced air and air conditioning systems.

### 248—Insulation Catalog

Acme Asbestos Covering & Flooring Co., Fulton and Elizabeth Streets, Chicago, Illinois, offers their new 1936 two-color catalog on insulations. The book, in modern style typography and illustration, contains information on the manufacture and use of insulating materials. A complete line of pipe coverings, sheets, blocks, cements, general asbestos products, home insulation materials is treated.

### 249—Operating Costs of Light Trucks

Metropolitan Life Insurance Company, 1 Madison Avenue, New York City, announces a new booklet by its Policy Holders Service Bureau, covering operating costs of light duty trucks. The booklet contains 24 detailed operating cost tables. The information was obtained from original sources of actual operating companies. Various breakdowns are presented as for instance, by truck capacity, by length of route, by total mileage, by state or geographical area. The information can be used to compare with contractor's own truck cost records.

### 250—Register Catalog

Catalog No. 36 announced by The Auer Register Co., Cleveland, Ohio, shows illustrations and tabular descriptions of finishes, sizes, prices for the company's baseboard registers, floor registers, wall registers, cold air faces, ventilating registers and grilles, air-conditioning registers, directional flow registers, and miscellaneous equipment manufactured by the Auer Company.

## New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 99.

### 251—Abridged Control Catalog

The Mercoid Corporation, 4201 Belmont Avenue, Chicago, Ill., announces catalog No. 100, an abridged tabulation of automatic controls for heating, air conditioning, refrigeration and industrial applications. The catalog contains illustrations and full specifications for the company's line of thermostats, transformers, relays, time switches, limit controls, furnace controls, temperature controls, pressure and water controls, cutouts, stoker and oil-burner controls and gas valves.

### 252—Rotary Shear Catalog

Niagara Machine & Tool Works, 637 Northland Avenue, Buffalo, New York, announce Bulletin No. 70-C, covering the line of machines for cutting circles and rings and for slitting and flanging. As in previous catalogs by this company, elaborate illustrations show the important features of construction as well as full views of the various machines. Accompanying text explains all of the features of design and operation. Tables give the various sizes and capacities for each unit.

### 253—Electric Motor Booklet

The Ohio Electric Mfg. Co., 5900 Maurice Avenue, Cleveland, Ohio, has just released a new bulletin entitled "Why Ohio Motors Are Reliable." This 16-page Bulletin pictures and describes manufacturing operations and tests to which the parts and completed motor are subjected.

### 254—Electric Alternators

A two-page leaflet, describing the Enterprise electric alternators for intermittently alternating electrical circuits; such as oil burners, magnetic valves, etc., is announced by Enterprise Foundry Corporation, Process Machinery Division, 2900 Nineteenth Street, San Francisco, California. The leaflet explains how the alternator replaces duplicate safety devices and acts as a master switch which does not carry current when operated. The leaflet gives complete information on construction and operation, together with typical wiring diagram for motor-magnetic switches circuit.

### 255—Ventilation for Cooling

Air Controls, Inc., Division of The Cleveland Heater Co., 1933 West 114th Street, Cleveland, Ohio, announce Bulletin No. 21-B describing the application of Airate, an air circulator, designed for installation in the attic and sized to accomplish night air cooling. The application of an attic ventilating fan to drop inside temperatures to equal outside temperatures is explained as a means of comfort cooling. Drawings and photographs show suggested applications in the attic and at windows, registers in bedrooms and halls, while specifications cover the size and capacity of the unit required. A second bulletin describes the application of the Airate fan to churches, lodge halls, stores, restaurants, etc.

### 256—Nail Catalog

A catalog on nails has just been issued by The Angell Nail & Chaplet Co., 4580 E. 71st Street, Cleveland, Ohio. It is 3½ by 6¼ inches in size and consists of 44 pages and cover. It is profusely illustrated with every conceivable type of nail, the common defects in ordinary nails, how these defects can be overcome, analysis of a nail, etc., etc.

# NIAGARA BAR FOLDERS

for fast, accurate work  
and

REAL  
PROFITS



Power  
Drive  
Available

Easy operation, accurate work, adjustable for sharp or rounded bends, completely equipped with gages and stops for narrow or wide bends at desired angles, clamps and folds in one operation. 17" to 60" working lengths, 22 gage capacity.



COMPLETE EQUIPMENT FOR SHEET METAL SHOPS

Mail this Coupon for Bulletins  
on the Complete Line of Niagara Machines and Tools  
for Sheet Metal Work.

NIAGARA MACHINE & TOOL WORKS,  
637-697 Northland Ave., Buffalo, N. Y.

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| <input type="checkbox"/> Foot Gap Shears         | <input type="checkbox"/> Shears, Squaring, Rotary      |
| <input type="checkbox"/> Groovers—Seamers        | <input type="checkbox"/> Lever Shears & Punches        |
| <input type="checkbox"/> Slip Roll Formers       | <input type="checkbox"/> Machines for Turning, Wiring, |
| <input type="checkbox"/> Snips—Stakes—Hand Tools | Beading, Burring, Flanging                             |

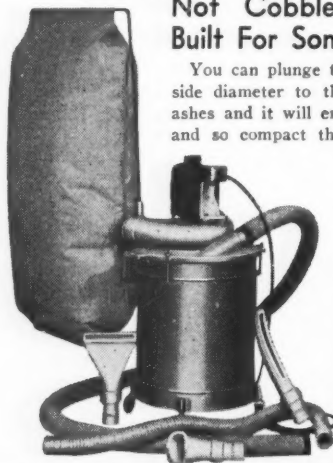
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## the GRAND RAPIDS FURNACE CLEANER

Is Made Expressly For Heating Men. It Is Not Cobbled From A Unit Built For Some Other Purpose.



You can plunge the hose which has a 2" inside diameter to the bottom of a big can of ashes and it will empty it. It is sturdily built and so compact that it can be carried about the house or in any car with men and tools without special arrangements.

"A Plan to Increase Your Sales" goes with the machine which is not an arm chair theory but the outcome of successful experience.

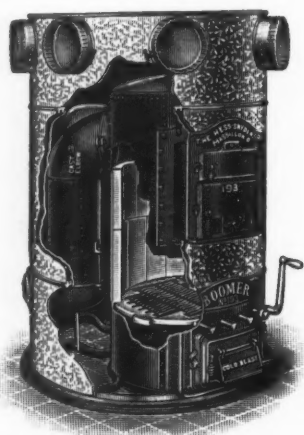
CONVENIENT  
TERMS—  
UNBELIEVABLY

LOW PRICE—OUR FREE TRIAL WITHOUT COST OR OBLIGATION TO YOU WILL PROVE OUR STATEMENTS.

Write for details

### GRAND RAPIDS FURNACE CLEANER COMPANY

Grand Rapids, Michigan



## Boomer Boiler Plate Furnaces

Also made with duplex grates and upright shaker.

Have been successfully made for 23 years. Where introduced have given satisfactory service. The fire pot liners are the best we can buy and we know of several Boomers that still have the original liners in, which are 23 years old. We have been making cast iron Boomers for 50 years.

If you are interested in selling a strictly high grade furnace, ask for prices and agency.

Nothing but the best of material enters into the making of Boomers.

When repairs are needed, avoid risk of dissatisfaction by ordering direct from the original patterns. Prices are low.

We sell to legitimate dealers only.

**THE HESS-SNYDER CO., MFRS.**  
Massillon, Ohio

## With the Manufacturers . . .

### Fox Announces Summer Finance Plan

C. A. Olsen, President of The Fox Furnace Company, manufacturers of Sunbeam Warm Air Furnaces and Air Conditioning Units, 120 East 41st St., New York City, has announced a new summer finance plan to help dealers take advantage of the increased interest in air conditioning during the summer months, effective immediately.

Under this summer finance plan, Sunbeam dealers can install any Sunbeam equipment on FHA terms. No down payment is required, and the first monthly payment can be deferred until September 30th. No extra charges are made for the summer financing plan. There is no recourse or holdback, and the dealer receives all of his money when the installation is completed.

### Century Furnace Sales Increase

Century Engineering Corp., Cedar Rapids, Iowa, announces that not only have 1936 sales to date been the largest on record for this period, but that a strikingly increased demand has been felt for the furnace-burner and boiler-burner units.

### Carl Johnson Joins Lamneck

Carl Johnson, formerly vice-president and general manager of the Champion Furnace Pipe Company of Peoria, Illinois, has joined Lamneck Products, Inc., Columbus, Ohio, manufacturers of pre-fabricated duct and fittings for forced air and gravity heating and air conditioning systems, according to an announcement made by Perl S. Miller, Lamneck president. Mr. Johnson will specialize in special development work with jobbers.

### Nelson Manufactures Bertossa Heater

The Nelson Company, Manufacturing Division, 2604 Fourth Avenue, Detroit, Michigan, has taken over the manufacturing rights to manufacture and distribute nationally the Bertossa Power Heater and allied air conditioning equipment. This equipment is now made in eight sizes, from 80,000 B. t. u. to 2,800,000 B. t. u. capacity.

### R. W. Bergen Represents I. T. L.

Illinois Testing Laboratories, Inc., Chicago, manufacturers of pyrometers and the "Velometer" for measuring air velocity, announce the appointment of Ralph W. Bergen with offices at 328 Chestnut Street, Philadelphia, Pennsylvania as their representative for Maryland, Delaware, southern New Jersey and eastern Pennsylvania.

### Chandler's School and Exposition

The Chandler Company, Cedar Rapids, Iowa, held a furnace school and exposition April 29 and 30 at the factory in Cedar Rapids, Iowa. The two-day program was so arranged that practically every phase of winter air conditioning and mechanical and gravity warm air heating were covered by authoritative speakers. The past, present and future of warm air heating and air conditioning was discussed by R. P. Wettstein of AMERICAN ARTISAN. Better gravity heating was discussed by E. B. Hauser, while the subject of humidity was presented by E. A. Chamberlin. A simplified, balanced trunk line for air conditioning systems, using standard fittings, was introduced by E. B. Hauser, while the proper spacing and method of baffling when blowers are applied to existing systems was the subject of a talk by Mr. Chamberlin. The sale and installation of stokers and the sale of oil burners was discussed by I. L. Foy of the Eddy Stoker Corporation, and C. L. Fontana of the Autocrat Oil Burning Corporation, respectively. C. W. Nessell of Minneapolis-Honeywell showed a moving picture and discussed the application of automatic controls.



## Humble Furnace Cleaning

(Continued from page 20)

cleaned and inspected. This date of cleaning is written on the sticker before we leave the job, I use this sticker because owners understand I am enough interested in their furnace to keep a record of the date of cleaning and the work done.

"In the years since I started in business for my grandfather, an old time tinner, I have tried several

### CLIFFORD HUMBLE

HEATING AND SHEET METAL WORK  
FURNACE WORK A SPECIALTY

ALL WORK GUARANTEED

PHONE NO. 11621

339-426 E. VERMONT ST.  
BRAZIL, INDIANA

**HAS A COMPLETE RECORD  
OF THIS FURNACE AND  
CAN BEST SERVE YOU**

Inspected by \_\_\_\_\_ Date \_\_\_\_\_

I Recommend and Install the HALL-NEAL Boiler Plate Steel Furnace with Heat Radiating Fins

1-19-31-Form PD 2

plans for enlarging our list of customers and getting more profitable work. Of all the plans tried, cleaning of furnaces has proved to be the most consistent, year after year, plan for our particular community.

"I have two slogans, 'Watch Our Service' and 'If Your Furnace Smokes C Humble.' These slogans appear on our truck and on the back of the coveralls of the mechanics."

## Oil Burning in Residences

(Continued from page 62)

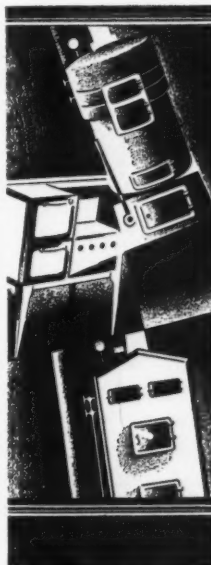
items in the flue gases was not determined and if present would increase the above loss. The recovery of heat loss by conduction or radiation from the heating plant, such as from the boiler, smoke-pipe or chimney would increase the efficiency above that indicated by the above loss.

A wide variation in stack losses was found, indicating that many installations may be rated as excellent and others as unacceptably poor. The largest loss found in the survey was 46 per cent and the smallest was 10 to 11 per cent. A separation into installations made during the three years previous to the survey and those made previous to that time indicates no improvement in the average efficiency.

An analysis of costs of oil heating on a unit floor area basis indicates a relation between cost of fuel and efficiency as shown by CO<sub>2</sub> and flue gas temperatures. A reasonable although arbitrary standard for an efficient installation would appear to be 500 F. and 10 per cent CO<sub>2</sub> without smoking, which corresponds to a stack loss of 18.5 per cent.

[The End]

## You get . . A Tighter Joint And . . . It Stays Tight with LACLEDE FURNACE CEMENT



Prove for yourself its enduring strength & ultimate economy.

**FREE TRIAL OFFER**  
We invite you to examine and test a free sample of

**LACLEDE FURNACE CEMENT**

Direct all requests and inquiries to  
Dept. C. P. S.

**LACLEDE-CHRISTY**

Makers of fine heat resisting products  
411 N. SEVENTH ST. LOUIS, MO. SINCE 1844

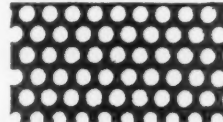
## PERFORATED METALS

Many designs of Perforated Metal for Architectural Grilles, Radiator Enclosures, Air Conditioners, Cabinets, Safety Guards, and for all screening and sizing operations.

Steel, Stainless Steel, Brass, Bronze, Copper, Monel, Aluminum, Zinc and other metals or materials perforated to your order.

Round holes from .020" to 7".  
Slot holes from .008" to 3" wide.  
Square holes of standard sizes.  
Complete line of brass and tin in small sizes. Prompt Service—Pleasing Prices.

Send us your next specifications.



(Note: Equally spaced holes make for uniform strength, improved appearance and durability.)

**The Harrington & King Co.**  
PERFORATING

5649 Fillmore St., Chicago, Ill.

New York Office, 114 Liberty St.



## ● "370 SPECIAL" ● RED OXIDE ROOF PAINT

*The Standard of Quality*

Sold only through recognized  
Sheet Metal Jobbers

Lyon, Conklin & Co., Inc., Baltimore & Washington  
Stichter Hardware Co., Reading, Penna.  
The J. M. & L. A. Osborn Co., Cleveland, Detroit,  
Buffalo  
Rockford Sheet Steel Co., Rockford, Ill.  
Arnold Supply Co., Birmingham, Ala.  
Herr & Co., Lancaster, Penna.  
Follansbee Brothers Co., Pittsburgh, Pa., Rochester,  
N. Y.  
Eagle Roofing and Art Metal Works, Tampa, Fla.  
The Moise Steel Co. of Ohio, Cincinnati, O.  
Vorys Brothers, Inc., Columbus, O.  
McClure-Johnston Co., Pittsburgh, Pa.  
Demmler Bros. Co., Pittsburgh, Penna.  
F. D. Mitchell, Albany, N. Y.

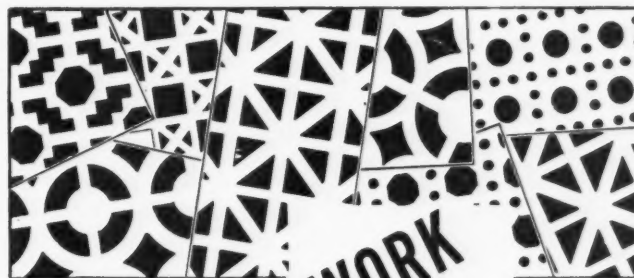
*Manufactured by*

**THOMPSON & COMPANY**

*Since 1847*

P. O. BOX 6757

PITTSBURGH, PA.



**GIVES YOUR WORK  
A MODERN TOUCH**

New designs of **Wissco**  
*Decorative Perforated Met-*  
*als* are modern from both the  
standpoint of the artistic and the  
utility. Their use adds to the  
appearance of your product. Greater  
concealment and more space for free  
air passage give them maximum efficiency.

Send for a copy of "*Wissco Decorative Perforated Metals*"



### WICKWIRE SPENCER STEEL COMPANY

41 East 42 St., New York

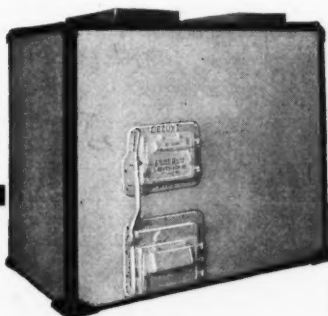
Buffalo

Worcester

Chicago

San Francisco

**WICKWIRE SPENCER  
perforated metals**



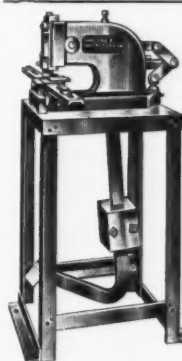
**A Real  
Profit Line**

Make more money. Sell more furnaces. You can do it if you handle the Liberty Line. Complete and modern in every respect. **FRONT-RANK** Steel Furnaces and **MELLOW** Cast Iron Furnaces. Equipped with either round or square casings in gravity or forced air types. Manual or automatic control and adapted to oil, gas, stoker, or can be fired by hand as your customer wishes.

Investigate this complete and up to the minute line now. Write today for literature and dealer proposition.

**LIBERTY FOUNDRY CO.**  
ST. LOUIS, MO.

**MELLOW  
WARM AIR  
FURNACE**



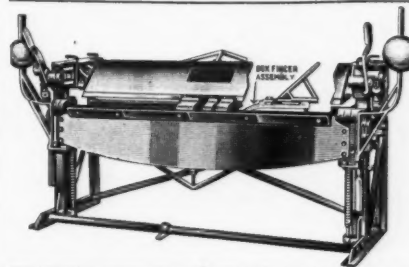
**WHITNEY  
TOOLS**



**Foot Presses.** Like all Whitney tools, this foot press is built to give a lifetime of good service. Expertly designed and made of the best materials throughout.

*The Whitney No. 4 One-Piece Hollow Punch.*

Drop forged and containing a self-centering spring point. Can be furnished in sizes from  $\frac{7}{8}$ " to  $1\frac{1}{8}$ " by  $\frac{1}{16}$ " variation.



*Whitney-Jensen Combination Bending and Box Brake.* Has 17 distinctive points of superiority. Write today for special descriptive leaflet fully illustrated.

The Whitney Metal Tool Company manufactures a complete and strictly quality line of tools. Of many hundreds of items which we

carry in stock, only a few can be shown in these advertisements. Always write us when you have a tool problem.

**Whitney Metal Tool Company**

91 Forbes Street, Rockford, Illinois



## New York Convention

(Continued from page 22)

ing the rate, percentage of wages to be paid, the minimum and maximum weekly benefit, the waiting period, the ratio of benefit week to duration of previous employment, and the maximum duration of benefits. Two other tables, taken from actual operating costs of three typical sheet metal shops and compiled by J. G. Dingle, C. P. A. of Ottawa, Illinois, showed the employer and employee payments under state and federal laws, the employer and employee federal old age benefit taxes, the total taxes and the percentage of taxes to sales and to pay roll. Using these tables as a basis for estimating costs, these actual figures show that in 1940 when the unemployment compensation taxes reach their maximum and the old age federal tax is  $1\frac{1}{2}$  per cent, the cost in New York will be 1.88 per cent of sales and 6.3 per cent of payroll.

### Compensation Insurance

W. A. Holland of the New York State Compensation Bureau declared that avoidance of the com-

pensation law by small business men has become a serious problem. Under the present law, men can form a co-partnership with the men doing the work and thus avoid carrying insurance. Some very interesting discussions on the loop holes and what can be done was developed on the floor of the meeting, culminating in the suggestion that the association ask Congressmen and others interested in the law to try to rectify present errors.

### Cooper Roofing

Henry Voegeli of American Brass Company, speaking on "Copper Roofing and Flashing" declared that an average one-family house can be waterproofed by applying a lightweight copper to basement walls for not more than \$160. For twenty-five dollars, approximately, copper can be used to eliminate or prevent termite destruction. As a means of eliminating air infiltration on windy days, Mr. Voegeli suggested that the wood house be wrapped in a one or two-ounce copper overcoat instead of the customary paper, and that such wrappings would provide an absolutely air-tight house for a

cost of not more than \$35 for an average house. This light weight copper is also valuable in attic floors or ceilings and when applied against the roof at a cost of approximately \$60, provides an air-tight attic space. This wrapping of copper also makes it possible to carry higher interior humidities with the exception of window areas, where, of course, condensation will occur. Mr. Voegeli declared that 10-ounce copper as a roofing material laid with 14-inch center standing seams is almost as serviceable as 16-ounce copper laid with the customary wide seams. 10-ounce material for roofing cost approximately \$14.45 per square, and could be laid in many communities for a total cost of \$25 per square, including material.

### Asbestos Siding

A. O. Weller of Johns-Manville, speaking on the subject "Asbestos Roofing and Siding" said that production today is approximately 53 per cent in shingles. Siding in shingle form is rapidly making headway and will become increasingly popular. At present, siding is made by two processes—the wet process

## RYBOLT STEEL FURNACE



**RYBOLT**

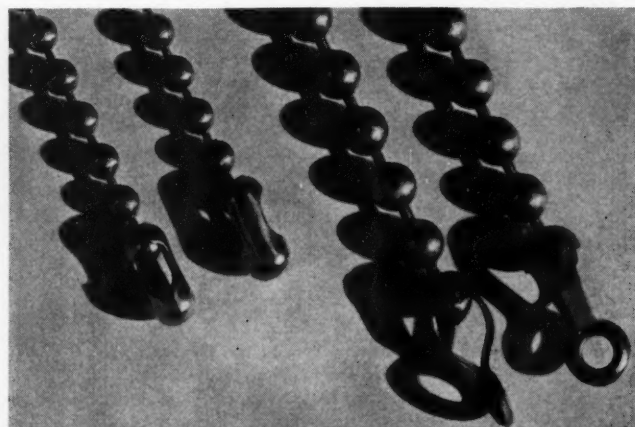
Dealers who have long sold the cast-iron RYBOLT Furnace are now welcoming the latest addition to the superior RYBOLT line—the RYBOLT Steel Furnace.

RYBOLT engineers have put all the knowledge and superior workmanship they have acquired in 26 years of quality furnace building into the making of this new type steel furnace. They have enabled us to put on the market the last word in steel furnace construction and performance—the new 14 point STEEL RYBOLT Furnace.

Write for free descriptive literature and sales assistance today.

*The Finest Furnace Ever to Bear the Rybolt Name*

**RYBOLT HEATER CO.**  
ASHLAND, OHIO



## BEAD CHAIN\*

This non-kinkable, smooth running chain, of swiveled metal beads, improves every job—in appearance and service. It is ideal for ventilator, skylight, heat control and other regulators. In standard sizes, metals and finishes, with couplings and pendants for many uses. Ask your jobber.

**THE BEAD CHAIN MANUFACTURING CO.**  
\*TRADE MARK REG.  
U. S. PAT. OFF. BRIDGEPORT, CONN.

**"BB"**  
The Mark  
of  
Quality

Seam  
Locked  
Every  
Few  
Inches

**"Shur-Lock"  
Pipe**

**BERGER BROTHERS CO.**  
229-237 Arch Street, Philadelphia, Pa.

EAVES TROUGH  
GUTTER HANGERS  
CONDUCTOR FASTENERS  
MITRES  
END PIECES AND CAPS  
CONDUCTOR HEADS  
ORNAMENTAL STRAPS  
VENTILATORS, ETC.

Write for catalog of the "BB" Line  
Buy from your jobber

## IT'S ... HEADQUARTERS!

FOR ...

Repair parts to fit all stoves,  
furnaces, boilers, or oil stoves.  
Furnaces, Pipe, Fittings, etc.  
Air Conditioning Blowers, Fil-  
ters, Controls, Humidifiers.

In fact it's headquarters for  
everything you need, made  
of only the finest materials.

WRITE FOR COMPLETE  
INFORMATION

**CENTRAL FURNACE & STOVE REPAIR COMPANY**  
3937 OLIVE STREET ST. LOUIS, MISSOURI

## HOW TO SELL FURNACES and REPAIRS



The only proved, positive and  
sure way to sell furnaces and  
repairs is to sell first

### TORNADO Furnace Cleaning Service

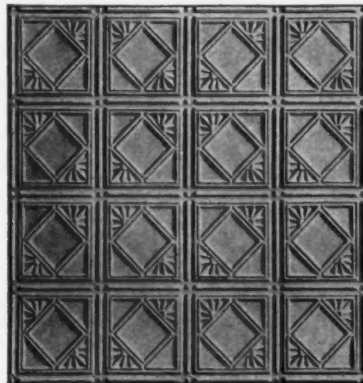
Furnace cleaning is easy to  
sell because it pays for itself  
many times over through fuel  
savings. Besides the profit  
you make on the cleaning job  
itself, you have still greater  
opportunity because you get  
into the basement where it  
is easy to convince the owner

that he needs a new furnace or repairs.

Hundreds of dealers are now building business with the  
TORNADO—the most powerful and complete furnace and  
boiler cleaner built. Leads the field! Low price—easy pay-  
ments! Write for complete information  
on a real money-maker!

**BREUER ELECTRIC  
MFG. CO.**

865 Blackhawk St., Chicago, Ill.



## CANTON STEEL CEILINGS! are PERMANENT!

Permanence is one of the many selling points  
in favor of CANTON STEEL CEILINGS. Besides  
the beauty and variety of styles obtainable, you  
can assure your customer a ceiling that will out-  
last by many, many years one made from plaster  
or any other material. Show him how the un-  
sightly plaster ceilings with their cracked, con-  
stantly loose construction are banished forever  
when you install a Canton ceiling. Steel ceilings  
always remain beautiful always remain durable.  
Many have been in service for over forty years  
and are good for another forty years.

Why not drop us a line? We'll be glad to send  
literature telling and showing how CANTON  
STEEL CEILINGS can make more extra money  
for you. Write today—a penny postcard will  
be sufficient.

Sold through all leading Sheet Metal jobbers.

**CANTON STEEL CEILING COMPANY**  
2280 WINFIELD WAY, S. E., CANTON, OHIO

Warehouse Service: 497 West St., New York City, and Canton, Ohio



which is laminated material under pressure and the dry process in which the fibres are mixed together and pressed. Such shingles may be had in narrow or wide, wavy or staggered butt, types and in varying lengths according to the amount of surface exposed to the weather. In answer to questions from the floor, Mr. Weller declared that the gray shingle seems to hold its original color best, but that colored shingles can be restained at little expense or the color changed entirely, if desired.

### Air Conditioning

Eugene P. Ferris, director, Central Bureau of Heating and Air Conditioning, Cleveland, addressing the convention on the subject "Winter Air Conditioning" declared that winter air-conditioning at present is badly oversold. "Winter air conditioning has made tremendous inroads in present types of heating, but there is at present too great a tendency to say air conditioning without specifying whether winter or summer, whether filtering, humidification, heating and cooling, dehumidification and all the other phases of air conditioning are in-

cluded. For many years the radiator heating contractors have practically ruined house interiors because it is necessary to place large radiators under windows in order to establish air circulation. Such air circulation is less than one air change per hour, but with warm air conditioning, air change can be increased to six changes or more per hour. In my bureau I am recommending cold air returns placed along outside walls and warm air registers on inside walls, because we have found it practically impossible to satisfactorily insulate a warm air boot, stack or register in an outside wall. I also suggest that velocities be selected so that the air stream will cross the floor and catch the cold air before it gets to the center of the room. No two installations are alike, and each installation must be engineered for the particular problems of the structure.

Prefabricated fittings have become popular in many areas, but I find danger arising from the fact that the contractor must often choose a size smaller or a size larger than the actual calculation; such a system eventually resulting in a hit or miss

duct sizing where one branch or one section may be too large and the next a little too small. In the City of Cleveland, winter air conditioning has brought forty shops from the back streets to main street; has resulted in a general decorating of shops and display rooms for more attractiveness, and we expect this progress to continue. In winter air conditioning, the selling job is done by the contractor, but merchandising is done by the system after it is installed.

"Selling, I think, is largely the establishing of confidence between the buyer and the contractor. It well may be that within a few years manufacturers will be known as manufacturers of heating equipment and not foundrymen pouring pounds of iron. The public has given warm air, air conditioning an advertising acceptance which millions of dollars' worth of advertising can not equal. I anticipate that assembled units, except on conversion work, will be replaced gradually by standard unit equipment in which each part of the apparatus is matched to all other parts.

(Continued on page 100)

## FAULTLESS REPAIR PARTS

from the original Graff patterns  
for the following furnaces:

FAULTLESS—COMFORT  
FAULTLESS—LACKAWANNA

FAULTLESS—SCIENTIFIC  
LACKAWANNA

COMFORT  
CAPITAL

RIVAL  
PHILADELPHIA

are carried in stock by the following Supply Houses

PHILADELPHIA, PA.  
Aetna Stove Co., Inc.  
Central Stove Repair & Fdy. Co.  
Standard Stove Repair Co.  
M. Stein.  
United Stove Repair Co.  
Weinstein Supply Co.  
BALTIMORE, MD.  
S. G. Kupler Co.  
Geo. J. Thaler, Inc.  
WASHINGTON, D. C.  
Fries, Beall & Sharp Co.  
NEW YORK CITY  
Faultless Range & Mfg. Co.  
BOSTON, MASS.  
Henry N. Clark Co.  
Huse & Carleton, Inc.  
Waverly Heating Supply Co.

NEWARK, N. J.  
Eselgroth & Co.  
NEW BRUNSWICK, N. J.  
New Brunswick Stove Co.  
NEW HAVEN, CONN.  
New Haven Stove Repair Co.  
BRIDGEPORT, CONN.  
Lipnick Stove Repair Co.  
PROVIDENCE, R. I.  
E. S. Hallock Co.  
SPRINGFIELD, MASS.  
The Burden-Bryant Co.  
WILLIAMSPORT, PENNA.  
Neyhart's, Inc.  
SHAMOKIN, PENNA.  
Geo. B. Keiser.

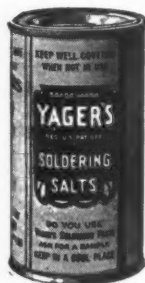
MINNEAPOLIS, MINN.  
Dunham-Scott Co.  
MILWAUKEE, WIS.  
Milwaukee Stove & Fce. Repair Co.  
The Speich Co.  
CHICAGO, ILL.  
Associated Heater Parts Co.  
M. Brueker.  
DETROIT, MICH.  
Detroit Stove & Fce. Repair Co.  
Star Steel Supply Co.  
FORT WAYNE, IND.  
Wayne Pattern & Fdy. Co.  
YOUNGSTOWN, OHIO  
Banner Repair Parts Co.  
BUFFALO, N. Y.  
O. G. & D. H. Donaldson.  
Minet Heating Supply Co.

PITTSBURGH, PENNA.  
The Graff Co.  
A. H. Johnson Co.  
Shambien Furnace Parts Co.  
ROCHESTER, N. Y.  
Henry Siebert Sons, Inc.  
ELMIRA, N. Y.  
C. Arthur Miller & Son.  
SCRANTON, PENNA.  
Samuel Weinberg & Sons, Inc.  
WILKES-BARRE, PENNA.  
White Hardware Co.  
Wilkes-Barre Hdwe. & Stove Co.  
ALLENTOWN, PENNA.  
Pennsylvania Supply & Mfg. Co.

**FAULTLESS HEATER CORP'N**

**MANUFACTURERS**  
Successor to THE GRAFF FURNACE COMPANY

**Cleveland, Ohio**



TRADE MARK  
**YAGER'S**  
REG. U. S. PATENT OFFICE

**SOLDERING  
SALTS**

**SAFE ~ FAST  
EFFICIENT**

AT ALL GOOD JOBBERS IN U. S. AND CANADA  
**ALEX R. BENSON, INC., HUDSON, N. Y.**  
MANUFACTURING SINCE 1873

## VIKING SHEARS

The original combination of a compound lever and a cutting blade 1/4" thick of specially tempered steel make Vikings your most dependable bench

shears. Thousands in world wide service over a 25 year period, recommend them. Buy a Viking for its lifetime of service. See your jobber or write direct for details.



**VIKING SHEAR CO., ERIE, PA.**



## Crescent Stresses Modernization With Metal

(Continued from page 14)

wooden gate drops during business hours.) Trucks back into the shop. They are met by hand-wheeled dollies, adjusted to the height of the motor truck bed. Thus incoming rods, sheets, etc., are distributed 'straight-line' to the various racks and bins which face the main gate. Sheets of architectural metal should be handled like dainty china. Manager Vanderbosch interjects a note to jobbers: "Please, when re-crating copper sheets of 10 feet or over, be sure to replace all wood sides and cross bases. Faulty shipments of such broken packages make a lot of seconds out of dandy 'firsts.'" He believes that copper, stainless steels and alloy metals should be labeled "Artists' Materials" and treated accordingly by carriers.

### Power Machines

Down the center, in single file, are the heavy presses, shears and brakes, flooded with skylighting and handy to the stock racks. Preliminary cutting and processing of the metal is thus expedited.

Along the outer wall, jutting at right angles to it, are the individual work benches. These wide tables are each fitted with tool trays, racks for punch kits, etc., Centered over each bench, two feet up, wall brackets support each man's soldering furnace, while below, convenience outlets of different cycles afford handy means of connecting drills, saws, shears and other speed tools.

### Product Advertising

There is an electric welding outfit for every third bench, a 3:1 ratio which Manager Vanderbosch believes is just about right. The portable arc welder on its large casters can be wheeled wherever needed. Of all "roving" equipment in use, the mobile grinder and buffer is probably the busiest. This machine with its assortment of "stones" ranging from carborundum to linen and flexible hose for rounding corners and reaching the out-of-the-way spots hums constantly cleaning up tubes, solders, welds.

Most of the year's appropriation for advertising was invested in the conspicuous front of their showroom, which, as the manager says, is the company's "second best advertisement, anyway." He cites "quality work" that brings in repeat orders and evokes recommendations as of first importance in the promotional program. "Word of mouth is a lot cheaper than newspaper space in a town the size of ours, so we strive to add new recruits daily to our good-sized army of satisfied customers."

The rows of candy kettles, freezers, stock pots, etc., going through the company's retinning plant are a good example of the "good will" enjoyed. Milk plants, creameries and confectioneries send in equipment to be periodically renewed—as a matter of routine.

The displays of fabricated specialties elicit a certain amount of business, too. Among the household gadgets, one, a metal awning, is a particularly lively number now. It is cut from galvanized iron to simulate the natural sag of fabric, but is ribbed at intervals for a more artistic effect; the ribs also serving



ONLY  
**\$55.00**  
NET

complete with  
standard  
equipment\*

## PREMIER FURNACE CLEANER

Here is a powerful, light weight furnace cleaner priced at only \$55.00 yet it has many features not found in any other cleaner regardless of price. Equipped with a high speed, ball bearing motor rated at 1/2 H. P. Built by the world's largest and oldest manufacturer of high quality cleaners. Fully guaranteed. Ruggedly built and dependable, it provides efficient, trouble-free service year in and year out.

### \*Standard Equipment:

No. 10148—12' Metal Hose	No. 10189—20" Curved Cleaning Tool
No. 731-A—Bristle Brush	No. 53317—5" Cleaning Nozzle
No. 25177—18' Extension Cable	No. 25054—Blower and Suction Tool
No. 25070—Combination Coupling	No. 25052—Metal Adapter

Write today for complete specifications.

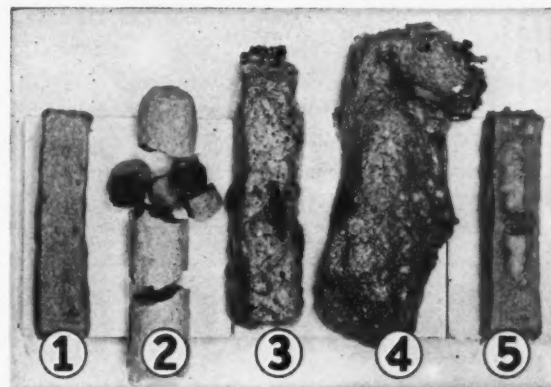
PREMIER FURNACE CLEANER DIVISION  
ELECTRIC VACUUM CLEANER CO., INC.

1734 Ivanhoe Road

Cleveland, Ohio

Distributors note: A few choice territories still open.

## IRONSET Does what others Promise



(Results of comparative tests of identical strips of 5 fire cements after being fired to high temperatures. No. 1 is IRONSET.)

HERE is the answer to your fire cement problem—non-shrinking IRONSET that holds its seal at high temperature (1800 F)—that absorbs the expansion of metal parts, is soft and pliable and evenly worked, that contains no greasy or oily fillers—will not smear or smudge. Write for bulletin covering this superior cement and for prices. Stocked by jobbers.

### IRONSET FURNACE CEMENT

for Setting Firepots, Furnaces, Boilers and Firebrick; for sealing smoke pipe, joints and chimney connections and pointing chimneys, fireplaces and incinerators.

Made by the  
Producers of  
FIRELINE

Fireline Stove & Furnace Lining Co.  
1866-E Kingsbury St.

CHICAGO, U. S. A.

to stiffen the canopy and prevent vibration. The conventional valance is also cut from metal and welded to the top. Householders tired of replacing frayed and flapping awnings every few years are ready prospects for an imperishable product which can be had from the sheet metal firm at about the same price as some temporary textile. Crescent just installed one 6 feet by 15 feet over a garden nook for an owner who was attracted by the added advantage of being able to paint or stripe it between the ribs in any combination of color he chose.

They exhibit tin-lined drawers for valuables and edibles—but go a step farther and enclose the top with a neat tin sliding top, flush, with neatly turned edges—"100% instead of 75% protection against dust, insects and rodents."

#### Larger Specialties

In addition there are standard restaurant fixtures, such as dish washers for ice cream stands, formed in galvanized iron with tubing sides, tops and angle iron legs. There is a turn sink, one for rinse;

the other for wash, fitted with a brush which rotates submerged, being held in place on the sink bottom by a suction cup.

A gold concentrator requiring 15 foot lengths of 6-inch channel iron, massive pipes and forgings—a type of job which well illustrates the widening spheres which modern facilities open up to sheet metal contractors. A silver refiner, or dryer, for reclaiming the precious metal from photographers' vitiated hypo solution. Filtrate from the developing baths in the dark room is spread on the metal pans, which are porcelain enameled to prevent the sludge from adhering. Then heated air from a steam unit atop the cabinet is forced down by a 3 H.P. blower at the rate of 6,000 ft. per min., being led over the holding trays by galvanized fins which are welded to the angle iron frame. For greater efficiency the 2-inch walls are filled with insulation; the doors are fitted with icebox hardware.

#### Handling Local Problems

Like most enterprising houses, Crescent devotes much time to the

solution of various problems met with in local industry. For Columbia studios, under the superintendence of Architects George C. Anderson and Leland Fuller, an elaborate dryer is being built to handle "still" negatives. The 8 by 10-inch commercial size film is fastened to racks in the top compartments with stainless clips. Their removal for constant replenishing is facilitated by means of aluminum tubes with cork handles. A wood cabinet was specified in this case, lined with asbestos and tin.

In addition to these specialty items there is the busy cornice department. Attracted by Crescent's own front, Mr. Little Grocer or Shoemaker wanders in for an idea on how his place can be modernized, and before he leaves Crescent has prepared a sketched treatment that will imbue his place with at least an air of modernity at a cost of perhaps \$175 or \$200.

#### Architectural Service

For the aggressive business man who insists on a really fine show of steel, copper and aluminum, etc.,



**NuDRY**

THE PERFECT FURNACE CEMENT

- It comes to you in dry form
- Takes less material to set a furnace
- DOES NOT CRACK OR POWDER WHEN FURNACE IS FIRED IMMEDIATELY AFTER APPLIED
- Will not shrink
- Keeps joints tight at all times

PYROLITE PRODUCTS COMPANY  
REFRACTORY ENGINEERS  
1221-31 W. 74th St. Cleveland, O.

GOHI Pure Iron-Copper Alloy, the longest lasting, low-cost ferrous metal, is available in all commercial sizes and gauges.

THE NEWPORT ROLLING MILL CO.  
Newport, Ky.



**GOHI**

**SHEET METAL**

**HOTEL LENOX**

Comfortable rooms—Attentive service—Memorable meals at fixed, fair prices—Only 5 minutes from the business district yet removed from downtown din—Rates, \$1.50 to \$3.00 per day per person—Descriptive folder containing map of downtown Buffalo mailed upon request.

140 NORTH ST. NEAR DELAWARE AVE. CLARENCE A. MINER  
PRESIDENT

**BUFFALO, N. Y.**



XX<sup>TH</sup> CENTURY FURNACES

KEEP OLD MAN WINTER ON THE RUN

XX<sup>TH</sup> CENTURY HEATING & VENTILATING CO.  
AKRON, OHIO

## With the Manufacturers . . .

### Root Joins Nelson Co.

Nelson Company, Manufacturing Division, Detroit, Michigan, announces that Ed. Root has joined their staff of heating and air conditioning engineers.

Mr. Root is well known in the heating industry both from his former connection with the Detroit Safety Furnace Company and from his association as lecturer at the short course in air conditioning that is held for heating and air conditioning contractors each year at the State College in Lansing, Michigan.

### L. B. Reed Elected Mercoid President

Lewis B. Reed was elected to the office of president of the Mercoid Corporation in Chicago, Ill., to succeed the late Mr. L. H. Van Ness. Mr. Reed has been associated with the company since its beginning, but was not actively engaged in its management until December, 1930, when he became vice president.

The company announces the opening of a branch office and warehouse at 25 Ivy St., Boston under A. W. Barr.

### Payne Furnace Expansion Program

Payne Furnace & Supply Co., Beverly Hills, California, manufacturers of gas-fired floor and basement type furnaces, air conditioning equipment, circulating heaters and gas venting materials announces construction of new offices and a considerable expansion in production and shipping facilities, now under way.

The modernization plans, according to E. L. Payne, vice-president & general manager of the company, will extend



throughout the entire plant and will reflect a long and careful study of the latest and best methods for increasing the efficiency of the entire organization.

William J. Gage, architect, has expressed an architectural design combining the picturesque with the utilitarian. The building will be extremely modern and Mr. Gage has gracefully worked the separate units of the existing building and the new addition into one picturesque mass.

### FOR YOUR CONVENIENCE

American Artisan, 6 N. Michigan Ave.,  
Chicago, Ill.

Please ask the manufacturer to send me more information about the equipment mentioned under the following reference numbers in "New Products" and "New Literature." (Check numbers in which you are interested):

31	32	33	34	35	36
37	38	39	40	41	42

239	242	245	248	251	254
240	243	246	249	252	255
241	244	247	250	253	256

Name ..... Title .....

Company .....

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Are you Manufacturer—Jobber—Dealer

# RYERSON

IMMEDIATE SHIPMENT FROM STOCK

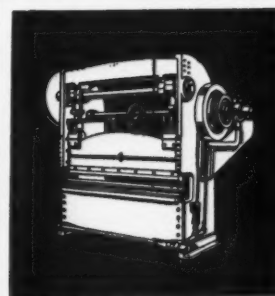
More than twenty kinds of prime quality sheets are carried in stock. There is a special sheet for every purpose. Also Bars, Angles, Rivets, Bolts, Tools and Metal-Working Machinery.

Write for Journal and Stock List

JOSEPH T. RYERSON & SON INC.

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DETROIT ST. LOUIS CINCINNATI CLEVELAND BOSTON

# SHEETS



PRESS BRAKE



HAND BENDING BRAKE

Steel Brakes—Presses—Shears

DREIS & KRUMP MFG. CO.

7404 LOOMIS BLVD.

CHICAGO

ALL REPAIR PARTS for FURNACES  
BOILERS  
STOVES  
RANGES

A.G. BRAUER  
SUPPLY COMPANY

316 NO. THIRD ST. + SAINT LOUIS

IN STOCK • READY FOR IMMEDIATE SHIPMENT

Ask for ...

# BURNLEY

TRADE MARK

SOLDERING ..... PASTE  
SOLDERING ..... SALTS  
SOLDERING ..... STICK  
SOLDERING ..... SOLUTION  
PIPE JOINT COMPOUND

Burnley Battery & Mfg. Co., North East, Pa.



Crescent will usually suggest an architect—though many fine installations in the Southwest were designed on their own drawing boards.

#### Interior Decoration

One of the most interesting fields entered by Crescent is interior decoration—especially for residences and small commercial shops. All true modernism, decorators say, is built around a completely practical idea, created for present day living. Above all, furniture and decoration must be built "to work."

The conceptions of Milton J. Black, California architect, who carried out these ideas for the Kettelle residence here illustrated, illustrate the idea and how the sheet metal shop carried out the architect's ideas. The installation made by Crescent shows table tops, counter tops, nosings of shelves and other areas exposed to wear all liberally plated in metal.

#### N. Y. Convention

(Continued from page 96)

In Cleveland, every job which passes through the Bureau is guar-

anteed and if there is anything wrong, it is ripped out. Humidification at present is grossly oversold, and we can not guarantee what we claim we can do. We guarantee forty-five per cent relative humidity whereas the average house can not carry more than thirty per cent relative humidity and on zero days, where there are storm sash on only part of the windows, twenty to thirty per cent would be a fair percentage. This industry should work for higher prices—higher prices of apparatus; higher prices for labor; higher margins of profit—because as prices go up the spread of profit increases.

At the Tuesday evening session, Edwin A. Scott, editor of *Sheet Metal Worker*, New York, continued the discussion of Social Security and conducted a round table discussion of the requirements of the law, as existing today in New York State. Mr. Scott pointed out that several suitable forms are now available for keeping the necessary records and information, and in answer to questions from the floor, explained step by step just how rec-

ords should be kept to comply with the law. Mr. Scott pointed out many of the unsatisfactory requirements which must be met for the present until changes are requested.

#### Minneapolis Code

(Continued from page 75)

and in the case of smoke pipes of a greater diameter than twelve (12) inches and of less area than six (6) square feet, shall be kept at least sixteen (16) inches away from any woodwork, and such woodwork shall be protected as before specified for the smaller smoke pipes, a distance of three (3) feet on each side of such smoke pipes.

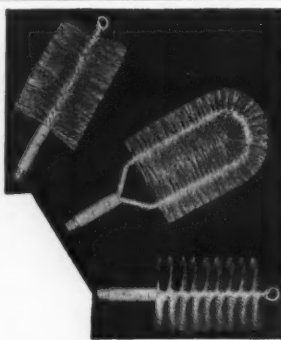
(b) Where metal smoke-pipes of twelve (12) inches or less in diameter pass through a wood or plastered stud partition, they shall be surrounded either by a body of brick, hollow tile, or other incombustible fireproof material of a thickness of at least four (4) inches, around such smoke-pipes; or they shall be surrounded by a sheet metal thimble of two (2) concentric rings at least two (2) inches apart, and the entire thimble so constructed that there will be a free circulation of air between the two rings forming the same. Smoke-pipes of a diameter of six (6) inches or less may have thimbles with one (1) inch air space.

#### SERVICE—NOT PRICE —IS THE TRUE MEASURE OF VALUE

Schaefer Brushes are built of the finest materials for their purpose and they're extra full-filled to increase wear, reduce labor and lessen replacement cost. Brushes by Schaefer are unconditionally guaranteed. The red seal is your protection.

SCHAEFER BRUSH MFG. CO.

1007 South Second St., Milwaukee, Wis.



**SCHAEFER BRUSHES**  
**BUY SCHAEFER—IT'S SAFER**

Install



**ÆOLUS**  
*Improved*  
**VENTILATORS**

FOR industrial buildings, schools, homes, theatres, etc. Made in 14 different metals. Constant ventilation—no noise—no upkeep.

**ÆOLUS DICKINSON**  
Industrial Division of Paul Dickinson, Inc.

3332-52 South Artesian Avenue  
Chicago, Ill.

## BELLEVUE STRATFORD

CLAUDE H. BENNETT, General Manager

In the heart of  
Philadelphia...  
socially, com-  
mercially and  
geographically.

Rates begin at  
\$3.50



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Court 1488

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4 cents for each word including heading and address. Count seven words for keyed address. Minimum \$1.00 for each insertion. One inch \$3.00. Cash must accompany order. Copy should reach us eight days in advance of publication date. Display rates for this page will be furnished on request.

## SITUATIONS OPEN

**SALES ENGINEER WANTED:** Prominent manufacturer of automatic control equipment has several openings for sales engineers. Previous University training or experience in air conditioning and heating, and an acquaintance with architects and engineers is essential. Address Key 861, "American Artisan," 6 N. Michigan Ave., Chicago.

**SALESMAN WANTED:** Furnace, air conditioners and stoker salesman. Must be able to lay out, estimate and get the orders. Leads furnished. A good opportunity for a young man willing to work. Can train you if you have the desire and some experience. Carl Heinzelman, Ann Arbor, Michigan.

**WANTED:** Good all around tinner and furnace man who can do neat work. Steady work. Write at once and state particulars. Woodstock Heating Company, Woodstock, Illinois.

**EXPERIENCED traveling salesman wanted.** Must be experienced in forced air and gravity heating. Address Key 370, "American Artisan," 6 N. Michigan Ave., Chicago.

**SALESMEN:** Sell the fastest electric soldering iron on the market, along with your own line. May be brought to red hot heat within 15 seconds. Write for particulars. Maple Valley Mfg. Co., Mapleton, Iowa.

**EXPERIENCED SALESMAN WANTED:** An exceptional opportunity is offered to an experienced furnace and air conditioning salesman who knows how to sell the dealer trade, and who has a thorough knowledge of gravity and forced air installations. Answer by letter only giving complete information about yourself and your past record. Write to A. W. Wrieder, General Sales Manager, Lennox Furnace Co., Syracuse, New York.

## MISCELLANEOUS

### RIBBED WIRE GLASS-13c sq. ft.

STOCK SHEETS, CASE LOTS, PLUS BOXING F. O. B. BUFFALO, N. Y. QUOTATIONS ON ALL KINDS OF GLASS ON REQUEST

Write for Samples

T. J. ATCHESON GLASS CO.  
953 Main St., Dept. A, Buffalo, N. Y.

### Manufacturers Agents

MANUFACTURERS WANTING additional representation often come to us for names of prospective agents now handling other lines in this field on a commission basis in a definite territory. It will pay you to be on record with us so we can refer your name to interested manufacturers. No charge or obligation, of course. It is a service we render free to manufacturers and representative. Just drop a line that you are interested in being on file and we will send you form to fill out. Address American Artisan, 6 N. Michigan Ave., Chicago, Ill.

## FOR SALE

### Sheet Metal Machines New and Really Rebuilt

A machine for every use and every machine is ready for use. The largest stock in Chicago. Ask for list.

Complete supplies and tools.

MAPLEWOOD  
MACHINERY CO., Inc.

Chicago

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561 W. Washington Blvd. State 1405

? ? ? ? ?  
**HAVE YOU A SHEET METAL PROBLEM: FORMING—BENDING—PUNCHING—SHEARING**  
**WE HAVE A MACHINE FOR EACH OPERATION ON SHEET METAL**  
Your Inquiries Earnestly Solicited  
**WARD MACHINERY CO.**  
SPECIALISTS  
**MACHINES—TOOLS—SUPPLIES FOR SHEET METALS**  
562 W. Washington Boulevard  
CHICAGO, ILLINOIS

ARC WELDER \$29.50. 150 lbs. of real welding equipment mounted on casters complete with cables, tongs, goggles and welding rod. 110-220 volts. Uses up to 1/4" rod. \$10.00 with order, balance on delivery. Also 60 lb. spot welder for 20 gauge or 1/8" wire \$15.00. Maywood Electric Co., 1800 S. 16th Ave., Maywood, Ill. Dept. B.

OLD ESTABLISHED Sheet Metal and Heating Business in good growing city of 12,000. Complete set of tools and good stock on hand. Poor health reason for selling. Give references in first letter. Address Key 372, "American Artisan," 6 No. Michigan Ave., Chicago.

## MISCELLANEOUS

### Patents and Trade Marks

Philip V. W. Peck

Barrister Bldg., Washington, D.C.

HOT DIP tinning of milk cans or any manufactured articles requiring tinning, galvanizing or lead coating, is profitable throughout the year. Write for our new circular showing how you can build your own equipment at small cost. Valuable information and instructions furnished free with purchase of necessary supplies. Retinning Mfg. Co., 3021 Greenview, Chicago, Illinois.

## SITUATIONS WANTED

**EXPERIENCED SHEET METAL** and furnace man desires connection with good shop anywhere in U. S. Formerly ran shop of own. Knows gravity and forced air. Can work from blue prints and design jobs. Sober. Steady. Has own tools. Write "American Artisan," Key 366, 6 N. Michigan Ave., Chicago.

**SHEET METAL layout man** wants steady work. Fifteen years experience. Single and free to travel. Gas welder. Can read blue prints and do all classes of work. Address Key 369, "American Artisan," 6 N. Michigan Ave., Chicago.

**ENGINEER** with broad and successful experience in gravity and air conditioning systems as sales manager, organizer and manager available to a reputable and aggressive manufacturer or dealer. Address Key 371, "American Artisan," 6 N. Michigan Ave., Chicago.

## FOR SALE

JOHNSON'S  
NEW HANDY MANUAL

on

HEATING, VENTILATING  
MECHANICAL REFRIGERATION

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AIR CONDITIONING

Just off the press, with 432 pages of practical, condensed information, tables, rules and diagrams.

Price \$1.00—Remit with order to

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6 N. Michigan Ave., Chicago, Ill.

## CUT PRODUCTION COSTS!

BUY INTERSTATE REBUILT

### — SHEET METAL MACHINERY —

— REBUILT BARGAINS —

BEADERS—12" throat B. G., 20 ga., \$27.50

TURNING MACH. LARGE—

With Standard, \$12.50

BRAKES—Chgo. Steel—6"16;

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BRAKES—Chgo. Steel—10"14 ga.

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ROLLS—Hand—30"x2" plain,

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ROLLS—Power—5"14 ga., Beloit,

\$235.00

KICK PUNCH—6" thr., 1/4"x10

ga., new, \$45.00

CIRCLE SHEAR—Pexto—Inside

and Outside, 3" to 40", \$45.00

PUNCH—No. 2 Whitney Hand,

\$3.50

PUNCH—No. 1 Whitney, 3/4"x

1/4", \$12.50

GROOVERS—20" Short Horn,

\$12.50, and 30" Nla., 24 ga.,

\$35.00

GAS FOLDERS—30"—36"—42"

burner, \$5.50 ea.

UNISHEARS—15" throat, 14 ga. Motor Drive.

STAKES—Beakhorn, \$10.00; Sq. Head, \$3.00

SHEARS—POWER—10"16 ga. Stoll, complete \$575.00

SHEARS—FOOT—30"—36"—42"—52"—66"

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HAND  
&  
POWER

**INTERSTATE MACHINERY COMPANY, INC.**  
130 S. Clinton St. [Free Parking] Chicago

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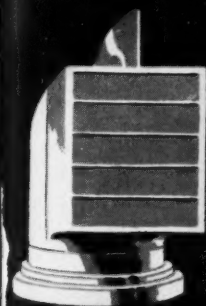
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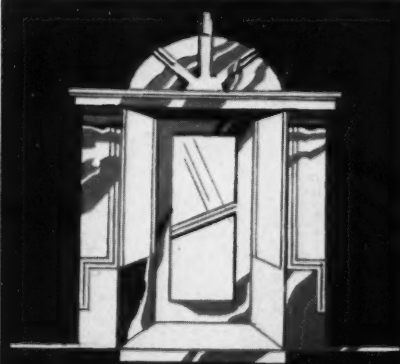
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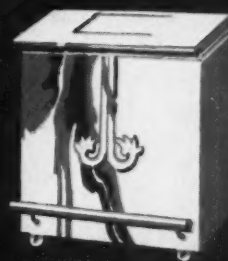
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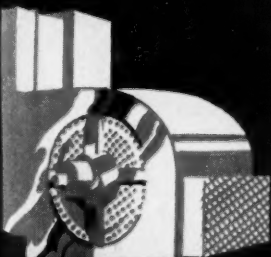
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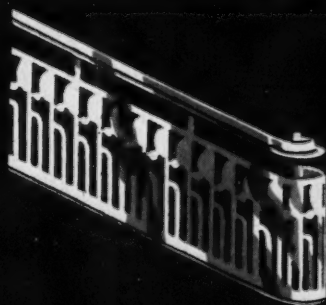
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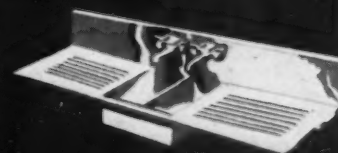
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WAREHOUSES: Union Hardware & Metal Co., Los Angeles . . . American Brass & Copper Co., San Francisco—Oakland  
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| 3. Rain Carrying Equipment      | 7. Non-Syphoning Roofing | 11. Frictionless Tee-Joint |
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